UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and **Atmospheric Administration**
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

MEMORANDUM FOR: The Record

AUG 9 2001

FROM: Wandall
Donald R. Knowles
Director, Office of Protected Resources

SUBJECT: Endangered Species Act (ESA) Section 7 Consultation Regarding an Application from **the Southeast Fisheries Science Center, NMFS (#1324)** for a Scientific Research Permit Under the Provisions of Section 10(a) of the ESA [Consultation #F/FPR/2001/00679].

This document constitutes the National Marine Fisheries Service's (NMFS) biological opinion based on our review of the proposed issuance of a scientific research permit to the Southeast Fisheries Science Center (SEFSC) - National Marine Fisheries Service, located in Miami, Florida, and its effect on endangered and threatened sea turtles in the North Atlantic in accordance with section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1536) (ESA). Formal consultation was initiated on May 25, 2001.

This biological opinion is based on information provided in the application for the proposed permit, published and unpublished scientific information on the biology and ecology of endangered and threatened sea turtles within the action area, and other sources of information. A complete administrative record is on file with NMFS' Office of Protected Resources, Endangered Species Division, Silver Spring, Maryland [Consultation #F/FPR/200 1/00679].

Consultation History

The applicant is the scientific research institution for NMFS in the southeastern U.S. As such, the SEFSC has been conducting sea turtle research in support of NMFS' sea turtle conservation and management responsibilities for over two decades. The SEFSC's research has been covered in the past by a variety of Section 1 O(a)(l)(A) permits issued by NMFS or the U.S. Fish and Wildlife Service (USFWS). Scientific research permit #585 was issued by NMFS to the SEFSC on May 4, 1987 authorizing the non-lethal take of an unspecified number of threatened loggerhead, endangered Kemp's ridley, endangered leatherback, endangered green, endangered hawksbill and threatened olive ridley turtles annually. Very little information about permitted activities is included in the actual permit issued in 1987. Permit #585 was modified three times: February 11, 1988 to allow "the capture of marine turtles with non-TED equipped shrimp nets for population abundance surveys and monitoring of channel dredging". Modification #2 was issued on December 16, 1992 extending the expiration date of permit #585 to March 3 1, 1993. Modification #3 was issued March 24, 1993 extending the expiration date to December 3 1, 1993. In 1993, NMFS-Southeast Regional Office (SERO) applied for and was issued a research permit by the USFWS with NMFS concurrence pursuant to 50 CFR §222.309(d) [PRT #TE676379]. SEFSC-conducted research was covered under SERO's permit. In 1999, SERO applied to USFWS for a renewal of PRT #TE676379, which was issued. However, unlike the original issuance of research permit by the USFWS with NMFS concurrence pursuant to 50 CFR §222.309(d) [PRT #TE676379]. SEFSC-conducted research was covered under SERO's permit. In 1999, SERO applied to USFWS for a renewal of PRT #TE676379, which was issued. However, unlike the original issuance of the permit, NMFS did not review the application. The renewed permit contained language that authorized activities both in water and on land. In 2000, NMFS reviewed the USFWS permit and determined that NMFS had not reviewed and concurred with the issuance of the permit. It was recommended that SERO apply for a separate Section 10(a)(1)(A) permit issued by NMFS for activities taking place in the water. On July 17, 2000, NMFS received a separate application from SERO and issued permit #1260 to SERO on June 18, 2001.

The SEFSC is presently authorized, as agents of SERO for permit #1260, to conduct research activities focusing on sea turtle bycatch monitoring and bycatch reduction experimentation for pelagic longline fishing. The SEFSC is the responsible NMFS science center for fisheries managed under the Highly Migratory Species (HMS) Fishery Management Plan, including the Atlantic pelagic longline fisheries for swordfish, tuna, and shark. The incidental take of sea turtles in the HMS fisheries has been considered in other biological opinions and incidental take statements, the most recent having been signed on June 8, 2001[1]. Permit #1260 only authorizes SEFSC observers to handle, flipper and PIT tag, collect tissue samples and release sea turtles that are incidentally captured during the course of fishing operations conducted in accordance with the FMP and the June 8, 2001 biological opinion.

The June 8, 2001 biological opinion on HMS fisheries concluded that the long-term operation of the U.S. pelagic longline fishery at its historical level of interaction with sea turtles, taken together with the status of the species, the environmental baseline, and cumulative effects on the species, was likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. The June 8 opinion provided a Reasonable and Prudent Alternative (RPA) that would allow the continued operation of the pelagic longline fishery to proceed without jeopardizing those species. A major component of the RPA was the required closure of the Northeast Distant (NED) fishing area (usually known as the Grand Banks) to U.S.-permitted longline vessels. Although the NED is only fished by a small number of U.S. vessels (about 8-12) during a portion of the fishing year (June-November), the sea turtle capture rates in the NED are much higher than any other areas fished by the U.S. fleet, and the NED has accounted for half or more of the total sea turtle bycatch of the Atlantic pelagic longline fleet.

Recognizing that the U.S. domestic longline fisheries are a small segment of the total amount of longline fishing that occurs in the Atlantic Ocean, the June 8 opinion also concluded that research to develop or modify gear technologies and fishing strategies to reduce capture rates of sea turtles throughout the Atlantic Ocean would improve the status of sea turtles. Developing gear technologies or fishing strategies that are capable of significantly reducing the likelihood of capturing turtles or dramatically reducing the immediate or delayed mortality rates of captured turtles are needed to minimize the effects of domestic and international longline fishing vessels.

In order to increase the likelihood of survival and recovery of sea turtle populations in the Atlantic Ocean, the opinion included a conservation recommendation directing NMFS to "undertake, in consultation and

[1]The June 8, 2001 biological opinion was issued an errata on June 15 and July 20, 2001. For the purposes of this document, the biological opinion will be refered to as the June 8, 2001.

cooperation with the domestic pelagic longline fleet, a cooperative research program to develop and evaluate the efficacy of new technologies and changes in fishing practices. This program should commence by August 1, 2001 and should be completed within three fishing seasons (*i.e.*, by January 2004)." The RPA requires that, upon completion of the experimental fishery and its final analysis, NMFS Highly Migratory Species Division must promptly conduct a rulemaking to require the adoption of complementary bycatch reduction measures that have been shown to achieve overall sea turtle mortality reductions of at least 55%. This rulemaking must be completed before pelagic longline vessels are again allowed to fish within the NED area, other than as participants in the cooperative research program.

On May 25, 2001, the SEFSC submitted an application to this office to conduct sea turtle bycatch reduction research in the pelagic longline fishery of the Western North Atlantic. The permit application was noticed in the *Federal Register* on June 4, 2001 and posted on this office's website. Public comments were accepted through July 5, 2001. The SEFSC has responded to the substantive scientific comments received.

Description of the Proposed Action

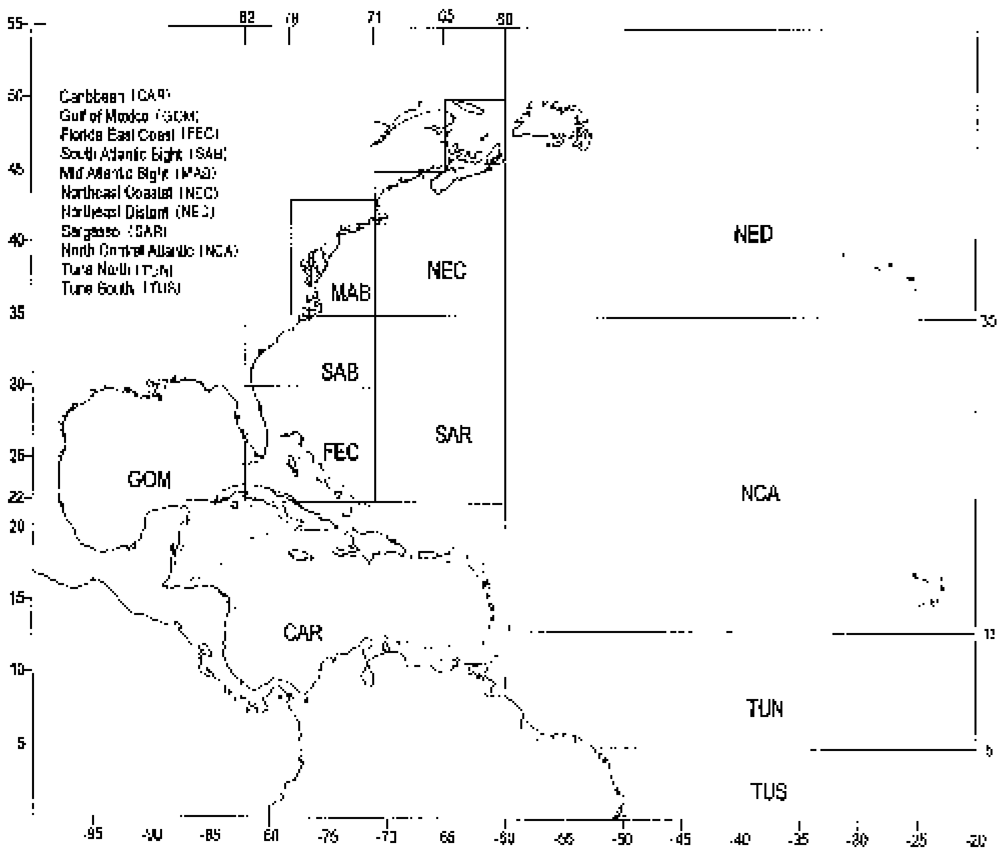
The National Marine Fisheries Service proposes to issue a scientific research permit to the Southeast Fisheries Science Center of the National Marine Fisheries Service based in Miami, Florida pursuant to section 10(a)(1)(A) of the ESA. The permit would authorize the SEFSC to conduct research to develop and test methods to reduce bycatch of sea turtles that occurs incidental to commercial, pelagic longline fishing. The researchers propose to work cooperatively with U.S. pelagic longline fishermen in the NED area to conduct this fishery-dependent testing (Figure 1). The NED Area is the only area used by the U.S. Atlantic fleet that is likely to yield the high level of turtle interactions required to test the effectiveness of bycatch reduction measures. The fishery dependent use of commercial fishing boats for this research is necessary because (1) a large level of fishing effort is necessary for the statistical power to complete this testing and fishery independent work would be cost-prohibitive and (2) testing should be conducted aboard a mix of representative platforms so that the testing results are clearly applicable to the fleets that would ultimately adopt bycatch reduction measures through this research.

Gear Evaluation Methodology
The field personnel for this research activity will be fishery biologists, biological technicians, fishery observers, and vessel operators and crew of U.S. domestic longline vessels that fish the NED. Fishery observers and gear technicians working for the NMFS SEFSC will be embarked on cooperative commercial fishing vessels and will oversee experiments conducted cooperatively with commercial fishermen. Their names and letters indicating their authority to oversee fieldwork will be supplied to the NMFS Office of Protected Resources prior to implementing the experiments. No experiments will be conducted by vessel operators without direct oversight by a NMFS employee or contracted biological technician or fishery observer. Observers and gear technicians will be trained by NMFS sea turtle biologists with expertise in handling and tagging sea turtles, NMFS fishery biologists with expertise in pelagic longline data collection, and NMFS gear experts with expertise in longline gear and gear evaluation procedures.

Vessel operators will be selected to participate in these experiments by NMFS based on their willingness to participate, their agreement to abide by the requirements of the research experimental design, and their understanding of the scientific principles. Vessel operators who agree to participate in the experiments will be required to participate in a workshop covering the fishing technology and requirements of the experimental design. The name of each vessel operator and a copy of a letter of agreement requiring compliance with all permit conditions will be provided to the Office of Protected Resources prior to that vessel initiating activities under the permit. Fishery observers and/or biological technicians working for NMFS will oversee the research experiment and all turtle takes by each fishing vessel. If any vessel does not strictly adhere to research protocols and turtle handling procedures, its participation in the experiment will be terminated.

The proposed research would simultaneously evaluate three experimental gear configurations against a control treatment. The treatment will be 1) natural squid bait with no hooks under the float lines 2) blue dyed squid bait with no hooks under the float lines and 3) mackerel bait with no hooks under the float lines. On all of the treatment portions of the sets the hooks adjacent to float lines will be spaced 20 fathoms from the float lines and hooks not adjacent to float lines will be spaced 40 fathoms apart. The control portion of the sets will use natural squid bait with hooks deployed at 40-fathom intervals and with hooks directly under each float line. The experimental design will be to rotate treatment and control

Figure 1 Pelagic Longline Fishing Areas



divided equally on each set of the participating vessels. Other than the specified bait and gear configuration, the vessel captain will determine when and where sets are made according to his normal practice.

After the completion of the sampling in 2001, a preliminary analysis will be conducted. Depending on observed take rates and effectiveness of the tested treatments, the experimental testing may be terminated early or individual treatments may be eliminated (that is, if one or more treatments are determined to be clearly effective or clearly ineffective based on the first year's data only). This analysis will be provided as a preliminary report by March 31, 2002. A final report will be provided by March 31, 2003.

Turtle Sampling Methodology

NMFS observers, technicians, fishing captains and crews will receive training on handling procedures for turtles encountered during the experiments under this permit. Training will be conducted by qualified NMFS personnel. Training will follow the guidelines and recommendations in Balazs *et.al.* (1995) and the NMFS 2001: Manual for Sea Turtle Life History Form and modified procedures using line and hook cutting and de-hooking devices (Anon, 2001) being developed by NMFS. All vessels participating in these experiments will be equipped with dip nets, line and hook cutters, and de-hooking devices, and training will be provided in the recommended procedures for using these devices to reduce post hooking or entanglement injury and mortality. A laminated instruction card will be provided to each observer and vessel to be prominently displayed near the gear hauling station for instant reference.

Captains, crews, and observers will be required to scan main line as far ahead as possible during gear retrieval to sight turtles in advance and not get ahead of the main line while retrieving gear. Upon sighting a turtle the vessel and main line reel speed will be slowed and the vessel direction will be adjusted to move toward the turtle to minimize tension on main line and branch line with turtle. When the snap of the branch line is in hand, the vessel will continue to move toward the turtle at a speed as slow as possible, if not possible vessel will stop with engine out of gear and turtle will be brought along side the vessel. Branch line will be retrieved slowly keeping a gentle consistent tension on the line. Slack will be maintained on the branch line to keep the turtle near the vessel and in the water.

Once the turtle is alongside the vessel the observer will assess the turtle condition and size and determine if it is hooked or entangled and if hooked whether the hook is ingested or external. If the turtle is small enough, and if conditions are such that it can be safely brought aboard the vessel, the observer will use a dip net that meets standards specified in NMFS regulations to carefully bring the turtle aboard by placing the net under the turtle and safely lifting it out of the water and onto the deck. The turtle will then be handled per the procedures below. If the turtle is determined to be too large to safely board without causing further injury to the turtle, or if conditions are such that the turtle cannot be safely brought aboard, then the turtle will be identified and photographed and, if possible, a tissue biopsy will be obtained using a 10 ft pole with a biopsy coring device attached to the end. The coring device is a sharp-edged, circular metal device about 6 mm in diameter with 3-4 teeth inside that point inward so as to trap the sample. Using this device the observer will target the shoulder region or carapace (leatherbacks) of the animal. Observers will be instructed to avoid trying to gather biopsies from the head region to avoid serous injury to the animal.

Line/hook cutters or de-hookers will be used to remove longline gear. If not hooked internally, the hook will be removed using a NMFS-developed and approved de-hooking device. If the hook cannot be removed without causing further injury to the turtle, a hook-cutting device developed and approved by NMFS will be used to cut the exposed hook. If the turtle is hooked internally or in the mouth, the leader and any portion of the hook exposed will be cut using the line/hook cutting device as close to the turtle as possible without causing further injury. Line cutters will be used to clip and remove line to release the turtle; no line will be left attached to the turtle if possible. When releasing a turtle, the vessel shall be in neutral and the turtle eased into the water and observed to be safely out of the way before engaging the vessel’s propeller.

Table 1 summarizes the expected maximum level of take and activities affecting any taken sea turtles.

Table 1. Anticipated take level by Activity

Number of individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category	Location	Date(s)	Details
415	Loggerhead, mixed stocks, primarily northern and southern nesting subpopulation	juvenile / sub-adult	unknown	wild	capture with experimentally modified and control longline fishing gear/ handle/ measure/ skin biopsy/ flipper tag/ PIT tag	Grand Banks, North Atlantic	8/1/01-12/31/02	see application for details
20	Loggerhead				Affix conventional satellite tag			sub-sample of 415
75	Loggerhead				Affix pop-up satellite tag			sub-sample of 415
301	Leatherback	sub-adult/ adult	unknown	wild	capture with experimentally modified and control longline fishing gear/ handle/ measure/ skin biopsy/ flipper tag/ PIT tag	Grand Banks, North Atlantic	8/1/01-12/31/02	handling, etc., only if boatable
2	Green	juvenile / sub-adult	unknown	wild	capture with experimentally modified and control longline fishing gear/ handle/ measure/ skin biopsy/ flipper tag/ PIT tag	Grand Banks, North Atlantic	8/1/01-12/31/02	
2	Kemp's ridley	juvenile / sub-adult	unknown	wild	capture with experimentally modified and control longline fishing gear/ handle/ measure/ skin biopsy/ flipper tag/ PIT tag	Grand Banks, North Atlantic	8/1/01-12/31/02	
2	Hawksbill	juvenile / sub-adult	unknown	wild	capture with experimentally modified and control longline fishing gear/ handle/ measure/ skin biopsy/ flipper tag/ PIT tag	Grand Banks, North Atlantic	8/1/01-12/31/02	

The condition of turtles brought aboard the vessel will be assessed by the observer. Turtles that appear comatose will be placed in a shaded, protected area covered with a moist cloth with the head in a down position. The hindquarters will be elevated several inches, and resuscitation attempted. The turtle will be checked periodically for up to 24 hours; the observer will touch the eye and pinch the tail periodically to see if there is any response. If there is no response after 24 hours, the turtle will be judged dead. The observer will leave any entangled line or hook in place and cut the line leaving about 2 feet of line remaining and tape it to the turtle. The observer will then collect standard life history data (see below) and write collection identification information on a tag, attach the tag securely to the turtle, and store the turtle in a plastic bag on ice or in a freezer. Turtles successfully resuscitated will be treated as active turtles (see below).

Active turtles brought on board, if they cannot be worked up immediately, will be placed in a shaded, protected and restrictive area and covered with a moist cloth. The animals' movements will be restricted by penning it up in a makeshift fashion using available resources, or the animal will be turned on its back and supported with towels or carpeting to prevent rolling. Species will be identified and the turtle will be photographed to verify identity and to document the hook location. The entangling line, if any, will be removed as will the hook – if it can be accomplished without causing further injury (deeply ingested hooks will not be removed). Turtles will be measured (carapace length and width), flipper tagged, and scanned for PIT(Passive integrated Transponder) tags according to standard protocols. Injuries or anomalies will be described. PIT tags will be placed in the left front flipper of all turtles without PIT tags.

Tissue samples will be taken on all turtles by a biopsy punch (6 mm) of the trailing edge of the rear flipper per standard protocol and preserved in a supersatured salt DMSO solution. Turtles will be placed on their back and the trailing edge of the rear flipper swabbed with betadine. Placing the flipper against the plastron, the observer will press the biopsy punch firmly into the flesh as close to the posterior edge of the flipper as possible, cutting all the way through the flipper. A wooden skewer will be used to remove the tissue plug and it will be stored in labeled vials of preservative. The area biopsied will be swabbed with betadine.

The applicant has requested that additional sampling of turtles occur by observers receiving specialized training and approved by NMFS to attach satellite tagging transmitters. Up to 20 loggerhead turtles may be outfitted with lanyard-attached conventional satellite tags to study the behavior and movements of pelagic stage turtles. Satellite transmitters will be attached to hard-shelled turtles over 45 cm in length. For this project the proposed method of transmitter attachment will employ a towed, hydrodynamic transmitter package that trails passively behind the turtle on a short, flexible lanyard. This method is preferred because of the minimal handling time, and minimal stress to the turtle on the deck of a boat, along with the greatly reduced drag of the transmitter in this configuration, as compared to other common attachment techniques that stick the transmitter on the high point of the turtles shell. The lanyard will be no more than 2/3 the length of the carapace, precluding entanglement with the flippers or any part of the turtles body. The trailing transmitter package is designed with two sets of breakaway systems: an in-line breakaway link, which prevents any problems for the turtle from potential entanglement of the transmitter; and 3 separate in-line corrodible links that eliminate the possibility of long-term encumbrance by dissolving steadily in salt water. The breakaway link is strong enough to hold the transmitter as it trails in the wake of the turtle, but weak enough that it pulls apart if the transmitter were to become entangled in fishing gear or other unforeseen manner. The corrodible links, made of brass, begin to disintegrate after approximately 1 year in seawater, leaving nothing attached to the turtle. The intervening lanyard will be 1 mm monofilament line, which will provide flexibility and better performance of the transmitter. The trailing hydrodynamic transmitters are all painted dull black to render them cryptic to other animals.

When a turtle is brought on deck, the transmitter along with the lanyard, which will be fully assembled, will be attached simply and quickly using techniques well-established for juvenile loggerhead and Kemp's ridley turtles. First, one of the posterior-most marginal scutes along the midline of the carapace will be cleaned lightly with a clean towel, then cleansed with a Betadine wipe. At a position approximately 10 mm from the rear edge of the shell, a single 3 mm hole will be drilled through the carapace where it overhangs the rear of the turtle. This process takes from 1 to 2 seconds, and does not elicit a response from the turtle. For each turtle, a new drill bit will be used, and the bit will be in disinfectant until the time of its use. In addition, Betadine will be applied to the small hole as a general disinfectant afterward. Next the end of the lanyard will be threaded through the small hole, and the length will be adjusted according to the guideline of not longer than 2/3 the turtle's carapace length. Finally, the lanyard will be attached using a corrodible crimp, that will corrode in saltwater, thus allowing the turtle to shed the entire transmitter package at the end of the study. The entire process, at an unhurried pace, takes approximately 4 minutes. The turtles will be released following the procedures detailed above.

An additional number of turtles (≤ 75) may be outfitted with archival pop-up satellite tags (PSAT) for the purpose of evaluating their effectiveness for the study of turtles' life history, and to investigate the effectiveness of the technique for collecting information on post-hooking mortality. Attachment of the PSAT tag base (Wildlife Computer tags weigh less than 60 g) to the carapace will be via either fiberglass mesh and laminating resin or by epoxy, the latter a technique being developed and tested by the SWFSC (Anon. 2001b). The procedures developed by the SWFSC use Marine Fix ® Fast (MFF) epoxy to attach a baseplate on a dry carapace on clean flat scutes toward the back of the turtle. The epoxy is mixed according to manufacturer's instructions and applied to the base plate of the satellite attachment system. The base plate is then pressed down firmly against the carapace for a few minutes to squeeze out any air pockets. Excess epoxy on the sides of the base plate is smoothed out with a wet gloved fingertip. The epoxy hardens completely in 30 minutes. The PSAT tag is then attached to the base plate using a short lanyard attachment. The turtles will be released following procedures detailed above.

All biopsy samples will be analyzed by the National Sea Turtle Genetics Lab at the SWFSC. Conventional satellite tag data will be analyzed by the NEFSC and PSAT data will be analyzed by the SEFSC. Flipper and PIT tag release and recapture data will be archived with the Cooperative Marine Turtle Tagging Program maintained by the Archie Carr Center for Sea Turtle Research at the University of Florida. Necropsies on carcasses returned to shore will be done by qualified personnel at either the SEFSC (frozen carcasses will be shipped to Miami) or the NEFSC. During necropsy samples will be taken for life history studies: humeri for ageing, etc. All data will be recorded on forms specially developed to record the details of this experiment as well as on the SEFSC Pelagic Longline Observer Program's forms: Longline Gear Configuration Log, Longline Haul Log, Individual Animal Log, and Sea Turtle Life History Form. All data recorded on these forms will be analyzed by the SEFSC or its contractors.

NMFS has determined in the accompanying decision memo that issuance of this permit meets the Section 10(a)(1)(A) criteria for issuance of permits.

NMFS proposes to authorize these activities for a 17-month period, from August 2001 to December 2002.

NMFS has identified the following conservation measures to minimize the effect of the proposed take of listed sea turtles associated with this research. These conservation recommendations will be added to the permit as special conditions:

a. The listed sea turtles must be taken by the means, in the areas, and for the purposes set forth in the permit application, as limited by the conditions specified in this permit.

b. Individuals operating under this permit and conducting capturing, tagging, tissue sampling, attaching satellite transmitters, or other invasive procedures, must be approved by NMFS. Alternatively, there must be an approved individual present to supervise these activities until such time that the others individuals have been approved by NMFS.

c. Tissue samples shall be taken by NMFS trained personnel only.

d. When handling and/or tagging turtles displaying fibropapilloma tumors and/or lesions, researchers will use one of the following procedures:
   i. Clean all equipment that comes in contact with the turtle (tagging equipment, tape measures, etc.) with a mild bleach solution, between the processing of each turtle, OR
   ii. Maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors and/or lesions, it is still advisable to disinfect sampling equipment between turtles.

e. All turtles shall be examined for existing tags, including PIT tags, before attaching or inserting new ones. If existing tags are found, the tag identification numbers shall be recorded and included in the annual report.

f. During release, turtles shall be lowered as close to the water's surface as possible to prevent potential injuries.

g. The Permit Holder, personnel, or designated agent acting on the permit holder's behalf shall carefully observe a newly released turtle and record observations on the turtle’s apparent ability to swim and dive in a normal manner.

h. The Permit Holder, personnel, or designated agent acting on the permit holder's behalf must not intentionally kill or cause to be killed any listed sea turtle. Care must be taken when handling live animals to minimize any possible injury to the animals and appropriate resuscitation techniques must be used on any comatose turtle prior to returning it to the water. All turtles must be handled according to procedures specified in 50 CFR 223.206(d)(1)(i).

i. Biopsy sampling:
   i. Sterile techniques must be used at all times.
   ii. A new biopsy punch will be used on each turtle.
   iii. Turtles brought on-board the vessel for sampling:
      (1) The sample area will be swabbed with alcohol or Betadine, before and after the sample is collected, to protect against infection.
      (2) Samples will be collected from a rear flipper, between two toes, approximately one inch from the distal end of the toe.
   iv. Turtles too large to bring on-board for sampling:
      (1) Turtles will be sampled using a pole-biopsy in the location most safely and easily accessed by the researcher/observer (usually the flipper).
      (2) Samples may be collected from anywhere on the limbs or neck, avoiding the

head. Samples may be collected from the carapace of the leatherback turtle if necessary.

j. The permit holder is required to submit annual reports and a final comprehensive report.

Reports must include:

i. a detailed description of activities conducted under this permit, including the species and total number of ESA-listed animals taken, the manner of take, and the dates/locations of take;

ii. any preliminary analyses of the data, including an assessment of the feasibility of terminating or shortening the duration of any of the experimental treatments, based on their to-date demonstrated effectiveness or ineffectiveness;

iii. measures taken to minimize disturbances to ESA-listed species and the effectiveness of these measures, a description of any problems and/or unforeseen effects which may have arisen during the research activities, and a brief narrative of the circumstances surrounding ESA-listed species injuries or mortalities, when appropriate;

iv. steps that have been and will be taken to coordinate the research with that of other researchers.

k. Total weight of transmitter attachments for any one turtle must not exceed 5% of the body mass of the animal. Each attachment must be made so that there is no risk of entanglement. The transmitter attachment must either contain a weak link or have no gap between the transmitter and the turtle that could result in entanglement.

l. Adequate ventilation around the turtles head shall be provided during the attachment of satellite tags. To prevent skin or eye contact with harmful chemicals used to apply tags, turtles shall not be held in water during the application process.

Action Area

The proposed action will affect wild green, leatherback, loggerhead, Kemp's ridley and hawksbill turtles from the Atlantic Ocean, Gulf of Mexico and Caribbean Sea. The research itself will be confined to the waters of the NED area (see figure 1 above), but, due to turtles' highly migratory nature, will affect sea turtles from the wider region.

Species Included in this Consultation

This biological opinion addresses the effects of the proposed action on the following species under NMFS' jurisdiction:

Common Name	Scientific Name	Status
Green turtle	*Chelonia mydas*	E/T[2]
Kemp's ridley turtle	*Lepidochelys kempii*	E
Leatherback turtle	*Dermochelys coriacea*	E
Loggerhead turtle	*Caretta caretta*	T
Hawksbill turtle	*Eretmochelys imbricata*	E

Critical habitat has been designated for the green, hawksbill and leatherback turtles, but none of the research included in this permit will occur within the boundaries of the critical habitat, thus NMFS concludes that the proposed action is not likely to adversely affect critical habitat for green, hawksbill and leatherback turtles.

The information available at this time indicates that pelagic longline interactions with large whales are rare and, to date, no serious injuries or mortalities of large whales have been recorded. In the June 8, 2001 opinion on the entire Atlantic pelagic longline fishery, no incidental take of listed large whales was anticipated (NMFS 2001b). On that basis, this Opinion concludes that the proposed research is not likely to adversely affect blue, fin, sperm, humpback, or northern right whales.

Status and Distribution of the Species

Analysis of the Species Likely to be Affected

Of the listed species under NMFS jurisdiction occurring in the action area, NMFS believes that only the five listed sea turtles may be adversely affected by the issuance of permit #1324.

Green Sea Turtle

Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare north of Cape Hatteras (Wynne and Schwartz, 1999). Several major nesting assemblages have been identified and studied in the western Atlantic (Peters 1954; Carr and Ogren, 1960; Carr *et al.*, 1978). Most green turtle nesting in the continental United States occurs on the Atlantic Coast of Florida (Ehrhart 1979). Green turtles are the largest of the hard-shelled sea turtles. Adult male green turtles are smaller than adult females whose lengths range from 92 to 110 cm (36 to 43 in.) and weights range from 119 to 182 kg (200 to 300 lbs). Their heads are small compared to other sea turtles and the biting edge of their lower jaws is serrated.

Green turtles have a more tropical distribution than loggerhead turtles, they are generally found in waters between the northern and southern 20^{o}C isotherms (Hirth 1971). Green turtles, like most other sea turtles, are distributed more widely in the summer when warmer water temperatures allow them to migrate north along the Atlantic coast of North America. In the summer, green turtles are found around the U.S. Virgin Islands, Puerto Rico, and continental North America from Texas to Massachusetts. Immature greens can be distributed in estuarine and coastal waters from Long Island Sound, Chesapeake Bay, and the North

[2]Green turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green turtles are considered endangered wherever they occur in U.S. Atlantic, Gulf of Mexico and Caribbean waters.

Carolina sounds south throughout the tropics (Musick and Limpus, 1997). In the United States, green turtles nest primarily along the Atlantic Coast of Florida, the U.S. Virgin Islands, and Puerto Rico. In the winter, as water temperatures decline, green turtles that are found north of Florida begin to migrate south into subtropical and tropical water.

The green turtle was protected under the ESA in 1978; breeding populations off the coast of Florida and the Pacific coast of Mexico are listed as endangered, all other populations are listed as threatened. The greatest threat to this species is the loss of its nesting habitat. Throughout the tropical and subtropical distribution of this species, beaches are eroded, armored, renourished, or converted for residential or commercial purposes. In addition, green turtles are threatened by fibropapilloma disease, incidental take in commercial or recreational fishing gear, and poaching (although poaching is infrequent in the United States). Green turtles are harvested in some nations for food, leather, and jewelry. Green turtles are also threatened by natural causes including hurricanes and predation by exotic species (fire ants, raccoons (*Procyon lotor*) and opossums (*Didelphus virginiana*)) and by poaching of eggs and nesting females.

There is evidence that green turtle nesting has been on the increase during the past decade. Recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Certain Florida nesting beaches where most green turtle nesting activity occurs have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the six years of regular monitoring since establishment of the index beaches in 1989. Recent population estimates for the western Atlantic area are not available.

While nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida, the northwestern coast of the Yucatan Peninsula, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). Post-pelagic green turtles feed primarily on sea grasses and benthic algae but also consume jellyfish, salps, and sponges. In the western Atlantic region, the summer developmental habitat encompasses estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds, and south throughout the tropics (Musick and Limpus, 1997). Like loggerheads and Kemp's ridleys, green sea turtles that use northern waters during the summer must return to southern waters in autumn, or face the risk of cold stunning.

General human impacts and entanglement

Anthropogenic impacts to the green sea turtle population are similar to those discussed above for other sea turtles species. Sea sampling coverage in the pelagic driftnet, pelagic longline, scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. In addition, the NMFS/Northeast Fisheries Science Center (NEFSC) is conducting a review of bycatch levels and patterns in all fisheries in the western Atlantic for which observer data is available. Bycatch estimates will be made for all fisheries for which sample sizes are sufficiently large to permit reasonable statistical analysis. This will be compiled into an assessment report. Until that analysis is completed, the only information on the magnitude of take available for those fisheries is unextrapolated numbers of observed takes from the sea sampling data. Preliminary sea sampling data summary (1994-1998) shows the following total take of green turtles: one (anchored gillnet), two (pelagic driftnet), and two (pelagic longline). Stranding reports indicate that between 200-300 green turtles strand annually from a variety of causes (Sea Turtle Stranding and Salvage Network, unpublished data). As with the other species, fishery mortality accounts for a large proportion of annual human-caused mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of other mortality.

In 1998, NMFS designated the waters surrounding the islands of Culebra, Puerto Rico as critical habitat for the green turtle. This area supports major seagrass beds and reefs that provide forage and shelter habitat.

Loggerhead Turtle

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Loggerhead sea turtles concentrate their nesting in the north and south temperate zones and subtropics and tropical Mexico, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (NRC 1990). The largest known nesting aggregation of loggerhead sea turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. The best scientific and commercial data available on the genetics of loggerhead sea turtles suggests there are five subpopulations of loggerhead sea turtles in the northwest Atlantic: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29^{o} N; (2) a south Florida nesting subpopulation, occurring from 29^{o} N on the east coast to Sarasota on the west coast; (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico and (5) a Dry Tortugas nesting subpopulation occurring in the islands of the Dry Tortugas near Key West Florida (approximately 200 nests per year) (NMFS, SEFSC 2001). This biological opinion will focus on the northwest Atlantic subpopulations of loggerhead sea turtles, which occur in the action area. Based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG 1998; TEWG 2000), NMFS believes these loggerhead turtle nesting aggregations are distinct sub-populations whose survival and recovery is critical to the survival and recovery of the species. Further, any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will focus on the five nesting aggregations of loggerhead sea turtles identified in the preceding paragraph (which occur in the action area) and treat them as subpopulations for the purposes of this analysis. Natal homing to the nesting beach provides the genetic barrier between these subpopulations, preventing recolonization from turtles from other nesting beaches. The importance of maintaining these subpopulations in the wild is shown by the many examples of extirpated nesting assemblages in the world. The loss of these assemblages has likely impacted the species' genetic diversity.

The loggerhead sea turtles in the action area are likely to represent differing proportions of the four western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9 percent of the loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead sea turtles in this area are from the northern subpopulation (Bass *et al*., 1998; Norrgard, 1995; Rankin-Baransky, 1997; Sears 1994, Sears *et al.* 1995). About 10 percent of the loggerhead sea turtles in foraging areas off the Atlantic coast of central Florida are from the northern subpopulation (Witzell *et al*., in prep). In the Gulf of Mexico, most of the loggerhead sea turtles in foraging areas will be from the South Florida subpopulation, although the northern subpopulation may represent about 10 percent of the loggerhead sea turtles in the gulf (Bass pers. comm). In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads are from the South Florida subpopulation and about 2% are from the northern subpopulation, while only about 51 percent originated from Mediterranean nesting beaches (Laurent *et al.* 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19 percent of the pelagic loggerheads are from the northern subpopulation, about 71 percent are from the South Florida subpopulation, and about 11 percent are from the Yucatán subpopulation (Bolten *et al.*, 1998).

Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years. Turtles in this life history stage are called “pelagic immatures” and are best known from the eastern Atlantic near the Azores and Madeira and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal *et al*. in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm SCL they recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder *et al.* 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals actually are more abundant in these areas or just more abundant within the area relative to the smaller turtles. Benthic immature loggerheads foraging in northeastern U.S. waters are known to migrate southward in the fall as water temperatures cool (Epperly *et al.* 1995; Keinath 1993; Morreale and Standora 1999; Shoop and Kenney 1992), and migrate northward in spring. Given an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; NMFS SEFSC 2001), the benthic immature stage must be at least 10-25 years long.

Although loggerhead sea turtles are most vulnerable to pelagic longlines during their pelagic, immature life history stage, there is some evidence that benthic immatures may also be captured, injured, or killed by pelagic fisheries. Recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, followed by permanent settlement into benthic environments. Some may not totally circumnavigate the north Atlantic. In addition, some of these turtles may either remain in the pelagic habitat in the north Atlantic longer than hypothesized or they may move back and forth between pelagic and coastal habitats (Witzell in prep.). Any loggerhead sea turtles that follow this developmental model would be adversely affected by shark gill nets and shark bottom longlines set in coastal waters, in addition to pelagic longlines.

Adult loggerhead sea turtles have been reported throughout the range of this species in the U.S. and throughout the Caribbean Sea. As discussed in the beginning of this section, they nest primarily from North Carolina southward to Florida with additional nesting assemblages in the Florida Panhandle and on the Yucatán Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Based on the data available, it is not possible to estimate the size of the loggerhead sea turtle population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead sea turtles. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014-92,182 annually, representing, on average, an adult female population of 44,780 [(nests/4.1) * 2.5]. On average, 90.7% of the nests were from the South Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle subpopulation. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation they belong. There are only an estimated 3,700 nesting females in the northern loggerhead subpopulation, and the status of this population is officially documented as stable at best (TEWG 2000).

From a global perspective, the southeastern U.S. nesting aggregation is critical to the survival of this species: it is second in size only to the nesting aggregations in the Arabian Sea off Oman and represents about 35 and 40 percent of the nests of this species. The status of the Oman nesting beaches has not been evaluated recently, but they are located in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills), the resulting risk facing this nesting aggregation and these nesting beaches is cause for considerable concern (Meylan *et al*. 1995).

Loggerhead sea turtles face a number of threats in the marine environment, including oil and gas exploration, development, and transportation; marine pollution; trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries; underwater explosions; dredging, offshore artificial lighting; power plant entrapment; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching. On their nesting beaches in the U.S., loggerhead sea turtles are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; exotic dune and beach vegetation; predation by exotic species such as fire ants, raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), opossums (*Didelphus virginiana*); and poaching.

Large numbers of loggerhead sea turtles from the subpopulations that occur in the action area are captured, injured, or killed in a wide variety of fisheries. Virtually all of the pelagic immature loggerheads taken in the Portuguese longline fleet in the vicinity of the Azores and Madiera are from western North Atlantic nesting subpopulations (Bolten *et al.* 1994, 1998) and about half of those taken in both the eastern and western basins of the Mediterranean Sea are from the western North Atlantic subpopulations (Bowen *et al.* 1993; Laurent *et al.* 1998). Aguilar *et al.* (1995) estimated that the Spanish swordfish longline fleet, which is only one of the many fleets operating in the region, alone captures more than 20,000 juvenile loggerheads annually (killing as many as 10,700). Estimated bycatch of marine turtles by the U.S. Atlantic tuna and swordfish longline fisheries, based on observer data, was significantly greater than reported in logbooks through 1997 (Johnson *et al.* 1999; Witzell 1999), but was comparable by 1998 (Yeung, 1999). Observer records indicate that an estimated 7,891 loggerheads were captured by the U.S. fleet between 1992-1999, of which an estimated 66 were dead (Yeung *et al.* 2000). Logbooks and observer records indicated that loggerheads readily ingest hooks (Witzell 1999). Aguilar *et al.* (1995) reported that hooks were removed from only 171 of 1,098 loggerheads captured in the Spanish longline fishery, describing that removal was possible only when the hook was found in the mouth, the tongue or, in a few cases, externally (flippers, *etc*.); the presumption is that all others had ingested the hook.

Loggerhead sea turtles also face numerous threats from natural causes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November) and loggerhead sea turtle nesting season (March to November); hurricanes can have potentially disastrous effects on the survival of eggs in sea turtle nests. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida; all of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane (Milton *et al*. 1992). On Fisher Island near Miami, Florida, 69 percent of the eggs did not hatch after Hurricane Andrew, probably because they were drowned by the storm surge. Nests from the northern subpopulation were destroyed by hurricanes which made landfall in North Carolina in the mid to late 1990s. Sand accretion and rainfall that result from these storms can appreciably reduce hatchling success. These natural phenomena probably have significant, adverse effects on the size of specific year classes; particularly given the increasing frequency and intensity of hurricanes in the Caribbean Sea and northwest Atlantic Ocean.

Status and trend of loggerhead sea turtles

Several published reports have presented the problems facing long-lived species that delay sexual maturity in a world replete with threats from a modern, human population (Crouse *et al.* 1987, Crowder *et al.* 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high, annual survival as juveniles through adults to ensure that enough juvenile sea turtles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general rule applies to sea turtles, particularly loggerhead sea turtles, because the rule originated in studies of sea turtles (Crouse *et al.* 1987, Crowder *et al.* 1994, Crouse 1999). Heppell *et al.* (in prep.) specifically showed that the growth of the loggerhead sea turtle population was particularly sensitive to changes in the annual survival of both juvenile and adult sea turtles and that the adverse effects of the pelagic longline fishery on loggerheads from the pelagic immature phase appeared critical to the survival and recovery of the species. Crouse (1999) concluded that relatively small changes in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population.

The subpopulations of loggerhead sea turtles in the northwest Atlantic — northern, south Florida, Florida panhandle, Yucatán and Dry Tortugas — are all subject to fluctuations in the number of young produced annually because of natural phenomena like hurricanes as well as human-related activities. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. Volusia County, Florida, for example, allows motor vehicles to drive on sea turtle nesting beaches (the County has filed suit against the FWS to retain this right) and sea turtle nesting in Indian River, Martin, West Palm, and Broward counties of Florida can be affected by beach armoring, beach renourishment, beach cleaning, artificial lighting, predation, and poaching.

As discussed previously, the survival of juvenile loggerhead sea turtles is threatened by a completely different set of threats from human activity once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these five subpopulations circumnavigate the North Atlantic over several years (Carr 1987, Bjorndal *et al.* 1994). During that period, they are exposed to a series of long-line fisheries that include an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar *et al.* 1995, Bolten *et al.* 1994, Crouse 1999). Based on their proportional distribution, the capture of immature loggerhead sea turtles in long-line fleets in the Azores and Madiera Archipelagoes and the Mediterranean Sea will have a significant, adverse effect on the annual survival rates of juvenile loggerhead sea turtles from the western Atlantic subpopulations, with a disproportionately large effect on the northern subpopulation that may be significant at the population level.

In waters off coastal U.S., the survival of juvenile loggerhead sea turtles is threatened by a suite of fisheries in Federal and State waters. Loggerhead turtles are captured, injured, or killed in shrimp fisheries off the Atlantic coast; along the southeastern Atlantic coast, loggerhead turtle populations are declining where shrimp fishing is intense off the nesting beaches (NRC 1990). Conversely these nesting populations do not appear to be declining where nearshore shrimping effort is low or absent. The management of shrimp harvest in the Gulf of Mexico demonstrates the correlation between shrimp trawling and impacts to sea turtles. Waters out to 200nm are closed to shrimp fishing off of Texas each year for approximately a 3 month period (mid May through mid July) to allow shrimp to migrate out of estuarine waters; sea turtle strandings decline dramatically during this period (NMFS, STSSN unpublished data). Loggerhead sea turtles are captured in fixed pound-net gear in the Long Island Sound, in pound-net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, in gill net fisheries in the mid-Atlantic and elsewhere, in fisheries for monkfish and for spiny dogfish, and in northeast sink gillnet fisheries (see further discussion in the *Environmental Baseline* of this Opinion). Witzell (1999) compiled data on capture rates of loggerhead and leatherback turtles in U.S. longline fisheries in the Caribbean and northwest Atlantic; the cumulative takes of these fisheries approach those of the U.S. shrimp fishing fleet (Crouse 1999, NRC 1990).

Leatherback turtle

The Recovery Plan for leatherback turtles (*Dermochelys coriacea*) contains a description of the natural history and taxonomy of this species (NMFS and FWS 1992). Leatherbacks are widely distributed throughout the oceans of the world and are found throughout waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour, 1972). They are predominantly distributed pelagically, feeding primarily on jellyfish such as *Stomolophus, Chryaora,* and *Aurelia* (Rebel 1974). Leatherbacks are deep divers, with recorded dives to depths in excess of 1000 m (Eckert *et al.*, 1989), but they may come into shallow waters if there is an abundance of jellyfish nearshore. Leary (1957) reported a large group of up to 100 leatherbacks just offshore of Port Aransas, Texas associated with a dense aggregation of *Stomolophus*. They also occur annually in places such as Cape Cod and Narragansett bays during certain times of the year, particularly the fall.

The leatherback is the largest living sea turtle and it ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Leatherback turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) and are often found in association with jellyfish. TDR data recorded by Eckert *et al.* (1989) indicate that leatherbacks are night feeders. Of the turtle species common to the action area, leatherback turtles seem to be the most susceptible to entanglement in lobster gear and, along with loggerheads, to longline gear. This susceptibility may be the result of attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in the pelagic longline fishery.

Although leatherbacks are a long lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported as about 12-20 years for females (NMFS SEFSC 2001). They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus, can produce 700 eggs or more per nesting season (Schulz 1975).

Compared to the current knowledge regarding loggerhead populations, the genetic distinctness of leatherback populations is less clear. However, genetic analyses of leatherbacks to date indicate that within the Atlantic basin significant genetic differences occur between St. Croix, the U.S. Virgin Islands and mainland Caribbean populations (Florida, Costa Rica, Suriname and French Guiana), and between Trinidad and the same mainland populations (Dutton *et al*., 1999), leading to the conclusion that there are at least 3 separate subpopulations of leatherbacks in the Atlantic. Much of the genetic diversity is contained in the relatively small insular subpopulations. To date, no studies have been published on pelagic or benthic foraging leatherbacks in the Atlantic and thus is it not known what populations are being impacted by the pelagic longline fishery. Although populations or subpopulations of leatherback sea turtles have not been formally recognized, based on the most recent reviews of the analysis of population trends of leatherback sea turtles, and due to our limited understanding of the genetic structure of the entire species, the most conservative approach would be to treat leatherback nesting populations as distinct populations whose survival and recovery is critical to the survival and recovery of the species. This Opinion therefore considers the status of the various nesting populations, as well as the Atlantic and worldwide populations. Any action that appreciably reduced the likelihood for one or more of these nesting populations or the basin wide population to survive and recover in the wild, would appreciably reduce the species' likelihood of survival and recovery in the wild.

Status and Trends of Leatherback Sea Turtles

Estimated to number approximately 115,000 adult females globally in 1980 (Pritchard 1982) and only 34,500 by 1995 (Spotila *et al*. 1996), leatherback populations have been decimated worldwide, not only by fishery related mortality but, at least historically, primarily due to intense exploitation of the eggs (Ross 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert 1996). Eckert (1996) and Spotila *et al.* (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. The Pacific population is in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila *et al*. 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers.comm.), the Western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (*i.e.* off Africa, numbering ~ 4,700) have remained consistent with numbers reported by Spotila *et al.* in 1996. Spotila (in press) indicates that between 1989 and 1995, marked leatherback returns to the nesting beach at St. Croix averaged only 48.5%, but that the overall nesting population grew. This is in contrast to a Pacific nesting beach at Playa Grande, Costa Rica, where only 11.9% of turtles tagged in 1993-94 and 19.0% of turtles tagged in 1994-95 returned to nest over the next five years. Characterizations of this population suggest that is has a very low likelihood of survival and recovery in the wild under current conditions.

Nest counts are currently the only reliable indicator of population status available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NMFS and USFWS 1995). The status of the leatherback population in the Atlantic is difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. The nesting population within U.S. jurisdiction is presumed to be stable. Numbers at some nesting beaches are increasing (e.g. St. Croix, Florida, Puerto Rico; P. Dutton, pers. comm.), although some nesting beaches in the U.S. Virgin Islands have been extirpated including nesting assemblages in other areas of the Caribbean such as St. John and St. Thomas. The nesting beach at Sandy Point, St. Croix, which has witnessed an increase in the population, has been subject to intensive conservation management efforts since 1981. However, it is not known whether the observed increase is due to improved adult survival or recruitment of new nesters since flipper tag loss is so high in this species. Better data collection methods implemented since the late 1980's may soon help to answer these questions. Based on an expected inter-nesting interval of one to five years, Dutton *et al*. (1999b) estimate a 19 - 49% mortality rate for re-migrating females at Sandy Point. Researchers are currently unable to explain the underlying mechanisms which somehow are resulting simultaneously in such high mortality levels to nesting age females, and yet exponential growth in the nesting population.

In the western Atlantic, the primary nesting beaches occur in French Guiana, Suriname, and Costa Rica. The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot, 1998). The current status of nesting populations in French Guiana and Suriname is difficult to interpret because these beaches are so dynamic geologically. Chevalier (pers. comm.) in a talk at the recent Annual Sea Turtle Symposium on March 2, 2000, entitled "Driftnet Fishing in the Marconi Estuary: the Major Reason for the Leatherback Turtle's Decline in the Guianas," stated that since the middle 1970's leatherback nesting has declined (1987-1992 mean = 40,950 nests and 1993-1998 mean = 18,100 nests). He states that there is very little shifting in nesting from

French Guiana and Suriname to other Caribbean sites (there has only been 1 tag recapture elsewhere).

The nesting population of leatherback sea turtles in Suriname is also decreasing. Chevalier claims that there is no human-induced mortality on the beach in French Guiana, and natural mortality of adults should be low. There has been very low hatchling success on beaches used for the last 25 years. Chevalier believes that threats to the population include fishing (longlines, drift nets, and trawling), pollution (plastic bags and chemicals), and boat propellers. Around 90% of the nests are laid within 25 km from the Marconi estuary. Strandings in 1997, 1998, and 1999 in the estuary were 70, 60, and 100, which Chevalier considers underestimates. He questioned the fishermen and actually observed a one km (gill) net with seven dead leatherbacks. This observation, coupled with the strandings, led him to conclude that there were large numbers captured incidentally in large mesh nets. There are protected areas nearshore in French Guiana; offshore, driftnets are set. There are no such protected areas off Suriname, and fishing occurs at the beach. Offshore nets soak overnight in Suriname; many boats fish overnight. According to Chevalier, the French Guiana government is starting up a working group to deal with accidental capture and to enforce the legislation. They will work towards the management of the fishery activity and collaborate with Suriname. They plan to study the accidental capture by the fishermen, satellite track turtles, and study strandings. The main problem appears to be the close proximity of the driftnet fishery to the nesting areas.

Swinkels (pers. comm.) also gave a presentation at the symposium on March 3, 2000 entitled “The Leatherback on the Move? Promising News from Suriname.” Swinkels stated that from 1995- 1999 there was a large increase in leatherback nesting in Suriname. There is a nature reserve in two parts: one in Suriname and one in adjacent French Guiana. There were increasing trends observed on three beaches but poaching was 80 percent. Samsambo is a very dynamic beach, which has been newly created (by natural events) and now is a nesting beach. In 1995 very few nests were poached because at the time there wasn’t much beach or nesting. Swinkels indicated that since that time, however, poaching has been increasing. In 1999, there were >4000 nests of which about 50% were poached. The beach has naturally been renourished over this period leading to increased nesting and increased poaching of new nests. Swinkels’ null hypothesis was that there had been a shift in nesting activity (from other nesting areas). His alternate hypothesis was that the new nesting represented new recruitment to the population.

The status of leatherbacks in the Pacific appears more dire than the Atlantic. The East Pacific leatherback population was estimated to be over 91,000 adults in 1980 (Spotila *et al.* 1996). Declines in nest abundance have been reported from primary nesting beaches. At Mexiquillo, Michoacan, Mexico, Sarti *et al.* (1996) reported an average annual decline in nesting of about 23% between 1984 and 1996. The total number of females nesting on the Pacific coast of Mexico during the 1995-1996 season was estimated at fewer than 1,000. Less than 700 females are estimated for Central America (Spotila *et al.* 2000). In the western Pacific, the decline is equally severe. Current nestings at Terengganu, Malaysia represent one percent of the levels recorded in the 1950's (Chan and Liew 1996).

Spotila *et al.* (2000) state that a conservative estimate of annual leatherback fishery-related mortality (from longlines, trawls and gillnets) in the Pacific during the 1990's is 1,500 animals. They estimate that this represented about a 23% mortality rate (or 33% if most mortality was focused on the East Pacific population). Spotila *et al.* (2000) assert that most of the mortality associated with the Playa Grande nesting site was fishery related. As noted above, leatherbacks normally live at least 30 years, usually maturing at about 12-13 years. Such long-lived species can not withstand such high rates of anthropogenic mortality.

Spotila *et al.* (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species' natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (*i.e.* egg, hatchling, and juvenile) remained static, "stable leatherback populations could not withstand an increase in adult mortality above natural background levels without decreasing...Even the Atlantic populations are being exploited at a rate that cannot be sustained." Model simulations indicated that an increase in adult mortality of more than 1% above background levels in a stable population was unsustainable. Spotila *et al.* (1996) recommended not only reducing mortalities resulting from fishery interactions, but also advocated protection of eggs during the incubation period and of hatchlings during their first day, and indicated that such practices could potentially double the chance for survival and help counteract population effects resulting from adult mortality. They conclude "the Atlantic population is the most robust, but it is being exploited at a rate that cannot be sustained and if this rate of mortality continues, these populations will also decline. Leatherbacks are on the road to extinction."

Zug and Parham (1996) point out that the combination of the loss of long-lived adults in fishery related mortality, and the lack of recruitment stemming from elimination of annual influxes of hatchlings because of intense egg harvesting has caused the sharp decline in leatherback populations. The authors state that "the relatively short maturation time of leatherbacks offers some hope for their survival if we can greatly reduce the harvest of their eggs and the accidental and intentional capture and killing of large juveniles and adults."

The conflicting information regarding the status of Atlantic leatherbacks makes it difficult to conclude whether or not the population is currently in decline. Numbers at some nesting sites are up, while at others it is down. Data collected in southeast Florida clearly indicate increasing numbers of nests for the past twenty years (13% increase), though it should be noted that there was also an increase in the survey area in Florida over time (NMFS SEFSC 2001). At one site (St. Croix), population growth has been documented despite large apparent mortality of nesting females; for data from 1979 on from St. Croix the trend in numbers of nests is increasing at 8.1 % per year (r= 0.130, S.E. = 0.014, NMFS SEFSC 2001). Where data are available, population numbers are down in the Western Atlantic, but stable in the Caribbean and Eastern Atlantic. It does appear, however, that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females.

In the absence of any other population models, the population cannot withstand more than a 1% human-related mortality level which translates to 150 nesting females (Spotila *et al.* 1996; Spotila pers. comm.). As noted above, there are many human-related sources of mortality to leatherbacks; a tally of all leatherback takes anticipated annually under current biological opinions completed for NMFS June 30, 2000, biological opinion on the pelagic longline fishery projected a potential for up to 801 leatherback takes (although this sum includes many takes expected to be nonlethal). In 1999 there were 19 animals observed taken dead, or by hook or ingestion, in the pelagic longline fishery. Scientific extrapolation of these data has not yet been completed so an accurate estimation of how many animals this represents across the entire fishery is currently unavailable. However, the observed sets represent approximately 3% of total effort for 1999; therefore a direct scaling to total effort would estimate that approximately 633 leatherbacks may have been taken dead or seriously injured by the fishery. A direct scaling to 100% effort is inappropriate, as take rates vary widely across different geographical areas of the fishery (as well as seasonally and inter-annually), but it may at least provide an idea of the potential order of magnitude of dead or seriously injured animals associated with this fishery. Perhaps a better way of looking at the data is to apply the 29% mortality estimate provided by Aguilar *et al.* (1995) to the average annual estimated take of 715 animals (Yeung *et al.* 2000), which indicates that an average of 207 animals annually either die or are seriously injured by pelagic longlines in the U.S. fleet.

NMFS completed a consultation on the Highly Migratory Species FMP which includes the pelagic longline fishery (June 8, 2001) which reanalyzed and reviewed measures to reduce the take of sea turtles. NMFS also recently completed a review of criteria used to estimate mortality of turtles hooked by pelagic longline gear (including the Aguilar study) and established a range of mortality assumptions for entangled (0% mortality), lightly-hooked (27% mortality), and hook ingested turtles (42% mortality) (NMFS 2001). Preliminary results from this reanalysis suggest that total takes of sea turtles by the pelagic longline fishery in 1999 are 991 loggerheads (95% CI = 510 - 2,089) and 1,015 leatherbacks (95% CI = 410 - 2,746). Of the 7,891 loggerhead and 6,363 leatherback turtles estimated to have been captured from 1992-1999, 66 loggerhead and 88 leatherbacks were estimated to have been released dead (NMFS SEFSC 2001, Part III). Analysis of these data using the newly developed serious injury criteria (NMFS 2001) is not yet complete.

Based on the information outlined above, pelagic longline fisheries alone may be killing leatherback sea turtles at levels equal to or greater than the 1% maximum sustainable level of total human-related mortality supported by the work of Spotila *et al*. (1996). When other pressures on leatherback sea turtle populations, including the number of leatherbacks that are injured or killed in other fisheries and other federal activities (*e.g.* military activities, oil and gas development, *etc*.), the continued harvest of eggs and adult turtles for meat in some Caribbean and Latin nations, the effects of ocean pollution, natural disturbances such as hurricanes (which may wipe out nesting beaches), the total number of turtles that die in any given year reduces the leatherback turtles reproduction, numbers, or distribution in a way that would be expected to appreciably reduce their likelihood of survival and recovery in the wild.

General human impacts and entanglement
Two to three leatherbacks are reported entangled in the buoy lines of lobster pot gear every year. Prescott (1988) reviewed stranding data for Cape Cod Bay and concluded that for those turtles where cause of death could be determined (the minority), entanglement is the leading cause of death followed by capture by dragger, cold stunning, or collision with boats. Entanglement in pot gear set for other species of shellfish and finfish has also been documented.

Leatherback interactions with the southeast shrimp fishery are also common. Turtle Excluder Devices (TEDs), typically used in the southeast shrimp fishery to minimize sea turtle/fishery interactions, are less effective for the large-sized leatherbacks. The NMFS has used several measures to protect leatherback sea turtles from lethal interactions with the shrimp fishery. These include establishment of a Leatherback Conservation Zone (60 FR 25260). NMFS established the zone to restrict, when necessary, shrimp trawl activities from off the coast of Cape Canaveral, Florida to the Virginia/North Carolina Border. It allows the NMFS to quickly close the area or portions of the area to the shrimp fleet on a short-term basis when high concentrations of normally pelagic leatherbacks are recorded in more coastal waters where the shrimp fleet operates. Other emergency measures may also be used to minimize the interactions between leatherbacks and the shrimp fishery. For example, in November 1999 parts of Florida experienced an unusually high number of leatherback strandings. In response, the NMFS required shrimp vessels operating in a specified area to use TEDs with a larger opening for a 30-day period beginning December 8, 1999 (64 FR 69416) so that leatherback sea turtles could escape if caught in the gear.

There is no data on the take of leatherback sea turtles in the tilefish bottom longline fishery although anecdotal reports indicate that some turtles have been caught. An observer program for the bottom longline fishery predominantly targeting sharks in the southeastern U.S. did report the incidental take of two leatherback turtles during the observer period from 1994 to 1996. Both turtles were released alive.

Kemp's Ridley Sea Turtle

Of the seven extant species of sea turtles of the world, the Kemp's ridley has declined to the lowest population level. The Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) (USFWS and NMFS 1992) contains a description of the natural history, taxonomy, and distribution of the Kemp's ridley turtle. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico. Most of the population of adult females nest in this single locality (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970's, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and there is cautious optimism that the population is now increasing.

Research being conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine Pass and the entrance to Galveston Bay. Between 1989 and 1993, 50 of the Kemp's ridleys captured were tracked (using satellite and radio telemetry) by biologists with the NMFS Galveston Laboratory. The tracking study was designed to characterize sea turtle habitat and to identify small and large scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NMFS Galveston Laboratory, pers. comm.).

After unprecedented numbers of Kemp's ridley carcasses were reported from Texas and Louisiana beaches during periods of high levels of shrimping effort, NMFS established a team of population biologists, sea turtle scientists, and managers, known as the Turtle Expert Working Group (TEWG) to conduct a status assessment of sea turtle populations. Analyses conducted by the group have indicated that the Kemp's ridley population is in the early stages of recovery; however, strandings in some years have increased at rates higher than the rate of increase in the Kemp's population (TEWG 1998). While many of the stranded turtles observed in recent years in Texas and Louisiana are believed to have been incidentally taken in the shrimp fishery, other sources of mortality exist in these waters. These stranding events illustrate the vulnerability of Kemp's ridley and loggerhead turtles to the impacts of human activities in nearshore Gulf of Mexico waters.

The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the USFWS and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of turtle excluder devices (TEDs). Adult ridley numbers have now grown from a low of approximately 1,050 adults producing 702 nests in

1985, to greater than 3,000 adults producing 1,940 nests in 1995 and about 3,400 nests in 1999.

The TEWG (1998) was unable to estimate the total population size and current mortality rates for the Kemp’s ridley population. However, the TEWG listed a number of preliminary conclusions. The TEWG indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Over the period 1987 to 1995, the rate of increase in the annual number of nests accelerated in a trend that would continue with enhanced hatchling production and the use of TEDs. Nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and a low of 702 nests in 1985. This trajectory of adult abundance tracks with trends in nest abundance from an estimate of 9,600 in 1966 to 1,050 in 1985. The TEWG estimated that in 1995 there were 3,000 adult ridleys. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994. The population model in the TEWG projected that Kemp’s ridleys could reach the intermediate recovery goal identified in the Recovery Plan of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. It determined that the data reviewed suggested that adult Kemp's ridley turtles were restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20-60 cm straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic.

The TEWG (1998) identified an average Kemp’s ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular internesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

The area surveyed for ridley nests in Mexico was expanded in 1990 due to destruction of the primary nesting beach by Hurricane Gilbert. The TEWG (1998) assumed that the increased nesting observed particularly since 1990 was a true increase, rather than the result of expanded beach coverage. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. As noted by TEWG, trends in Kemp’s ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp’s Ridley Recovery Plan.

Juvenile Kemp’s ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Post-pelagic ridleys feed primarily on crabs, consuming a variety of species, including *Callinectes* sp., *Ovalipes* sp., *Libinia* sp., and *Cancer* sp. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal, 1997). Juvenile ridleys migrate south as water temperatures cool in fall, and are predominantly found in shallow coastal embayments along the Gulf Coast during fall and winter months.

Ridleys found in mid-Atlantic waters are primarily post-pelagic juveniles averaging 40 centimeters in carapace length, and weighing less than 20 kilograms (Terwilliger and Musick 1995). Next to loggerheads, they are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June, and migrating to more southerly waters from September to November (Keinath *et al.*, 1987; Musick and Limpus, 1997). In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick, 1985; Bellmund *et al.*, 1987; Keinath *et al.*, 1987; Musick and Limpus, 1997). The juvenile population in Chesapeake Bay is estimated to be 211 to 1,083 turtles (Musick and Limpus, 1997).

General human impacts and entanglement
Anthropogenic impacts to the Kemp's ridley population are similar to those discussed above. Sea sampling coverage in the northeast otter trawl fishery, pelagic longline fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles. As with loggerheads, a large number of Kemp's ridleys are taken in the southeast shrimp fishery each year. Kemp's ridleys were also affected by the apparent large-mesh gillnet interaction that occurred in spring off of North Carolina. A total of five carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. This is expected to be a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all carcasses washed ashore.

Hawksbill Turtle
Hawksbill turtles are small to medium-sized sea turtles. They are distinguished from other sea turtles by two pairs of prefrontal scales; thick carapace scutes that overlap towards the turtle's posterior, four pairs of costal scutes; and two claws on each flipper. There are two recognized subspecies of hawksbill sea turtles, one in the Atlantic Ocean (ssp. *imbricata*) and one in the Pacific Ocean (ssp. *squamata*).

Hawksbill turtles use different habitats for different stages in their life cycles. Post-hatchling hawksbill turtles remain in pelagic environments to take shelter in weedlines that accumulate at convergence points. Juvenile hawksbill turtles (those with carapace lengths of 20-25 cm) re-enter coastal waters where they become residents of coral reefs which provide sponges for food and ledges and caves for shelter. Hawksbill turtles are also found around rocky outcrops, high energy shoals, and mangrove-fringed bays and estuaries (particularly in areas where coral reefs do not occur). Hawksbill turtles remain in coastal waters when they become subadults and adults.

Hawksbill turtles occur in tropical and subtropical waters of the Atlantic, Pacific, and Indian Oceans. In the United States, hawksbill sea turtles have been recorded in all states along the Gulf of Mexico and along the Atlantic coast to Massachusetts. In the United States, hawksbill turtles nest on the Atlantic coast of Florida, the U.S. Virgin Islands, and Puerto Rico. Hawksbill turtles nests in Florida are relatively rare, but Richardson *et al*. (1989) estimated that the Caribbean and Atlantic portions of the U.S. support a minimum of 650 hawksbill turtle nests each year

The hawksbill turtle was listed as an endangered species on June 2, 1970 (35 FR 8491). The hawksbill turtle has been endangered by significant modifications of its coastal habitat throughout its range. General overviews of the effects of habitat alteration on hawksbill turtles have been provided by National Research Council (1990) and NMFS and USFWS (1993). Throughout the Atlantic and Gulf of Mexico, problems such as egg poaching, domestic animals, beach driving, litter, and recreational use of beaches have presented problems for nesting hawksbill turtles. In addition, beach front lights appear to pose a serious problem for hatchling hawksbill (and other) turtles in the U.S. coastal areas. At sea, activities that damage coral reefs and other habitats that are important to the hawksbill turtle threaten the continued existence of this species. Hawksbill turtles are also threatened by natural causes including hurricanes and predation by exotic species (fire ants, raccoons (*Procyon lotor*) and opossums (*Didelphus virginiana*)) and by poaching of eggs and nesting females.

In 1998, NMFS designated the waters surrounding Mona and Monito Islands, Puerto Rico as critical habitat for the hawksbill turtle.

Environmental Baseline

By regulation, environmental baselines for biological opinions include the past and present impacts of all state, Federal or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR § 402.02). The environmental baseline for this biological opinion includes the effects of several activities that affect the survival and recovery of threatened and endangered species in the action area.

A large number of human activities have contributed to the current status of populations of threatened and endangered turtles in the action area. Some of those activities occurred in the past, ended and no longer appear to affect these turtle populations; other activities ended, but had effects on the structure or composition of turtle populations that continue to hinder their ability to reverse their decline toward extinction. Still other human activities appeared to affect turtle populations after their decline and continue to affect them. The following discussion summarizes the principal phenomena that are known to affect the likelihood that these endangered and threatened turtles will survive and recover in the wild.

Status of the Species within the Action Area

The listed species occurring in the action area are all highly migratory and occur temporarily in the NED area. Therefore, the range-wide status of the species given in the Status and Distribution of the Species section above most appropriately reflects the species' status within the action area.

(a) Federal Actions Affecting Species within the Action Area

In recent years, NMFS has undertaken several ESA section 7 consultations to address the effects of vessel operations and gear associated with Federally-permitted fisheries on threatened and endangered species in the action area. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on large whales and sea turtles. Similarly, recovery actions NMFS has undertaken under both the MMPA and the ESA are addressing the problem of take of whales in the fishing and shipping industries. The following summary of anticipated incidental take of turtles includes only those federal actions which have undergone formal section 7 consultation.

(1) Vessel-related Operations and Exercises

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the USCG, which maintain the largest federal vessel fleets, the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), and the Army Corps of Engineers (ACOE). NMFS has conducted formal consultations with the USCG, the USN (described below) and is currently in early phases of consultation with other federal agencies on their vessel operations (e.g., NOAA research vessels). In addition to operation of ACOE vessels, NMFS has consulted with the ACOE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. At the present time, however, they represent potential for some level of interaction. The Opinions for the USCG (September 15, 1995, July 22, 1996, and June 8, 1998) and the USN (May 15, 1997) provide further detail on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

(2) Additional military activities, including vessel operations and ordnance detonation, also affect listed species sea turtles. USN aerial bombing training in the ocean off the southeast U.S. coast, involving drops of live ordnance (500 and 1,000-lb bombs) is estimated to have the potential to injure or kill, annually, 84 loggerheads, 12 leatherbacks, and 12 greens or Kemp's ridley, in combination (NMFS 1997a). The USN will also conduct ship-shock testing for the new SEAWOLF submarine off the Atlantic coast of Florida, using 5 submerged detonations of 10,000 lb explosive charges. This testing is estimated to injure or kill 50 loggerheads, 6 leatherbacks, and 4 hawksbills, greens, or Kemp's ridleys, in combination (NMFS 1996). Operation of the USCG's boats and cutters in the U.S. Atlantic is estimated to take no more than one individual turtle—of any species—per year (NMFS 1995). Formal consultation on USCG or USN activities in the Gulf of Mexico has not been conducted.

The construction and maintenance of Federal navigation channels has also been identified as a source of turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in br channels and offshore borrow areas, move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. Along the Atlantic coast of the southeastern United States, NMFS estimates that annual, observed injury or mortality of sea turtles from hopper dredging may reach 35 loggerheads, seven greens, seven Kemp's ridleys, and two hawksbills (NMFS 1997b). Along the north and west coasts of the Gulf of Mexico, channel maintenance dredging using a hopper dredge may injure or kill 30 loggerhead, eight green, 14 Kemp's ridley, and two hawksbill sea turtles annually (NMFS 1997c). Additional incidental take statements for dredging of Charlotte Harbor and Tampa Bay, FL anticipate this project may incidentally take, by injury or mortality, two loggerheads or one Kemp's ridley or one green or one hawksbill sea turtle for Charlotte Harbor and eight sea turtles, including no more than five documented Kemp's ridley, hawksbill, leatherback, or green turtles, in any combination, for Tampa Bay.

US Army Corps of Engineers (COE) and Minerals Management Service (MMS) (the latter is non-military) rig removal activities also adversely affect sea turtles. For the COE activities, an incidental take (by injury or mortality) of one documented Kemp's ridley, green, hawksbill, leatherback, or loggerhead turtle is anticipated under a rig removal consultation for the New Orleans District (NMFS 1998). MMS activities are anticipated to result in annual incidental take (by injury or mortality) of 25 sea turtles, including no more than five Kemp's ridley, green, hawksbill, or leatherback turtles and no more than ten loggerhead turtles, due to MMS' OCS oil and gas exploration, development, production, and abandonment activities.

(3) Federal Fishery Operations
The most reliable method for monitoring fishery interactions is the sea sampling program, which provides random sampling of commercial fishing activities. Federally regulated gillnet, longline, trawl, seine, dredge, and pot fisheries have all been documented as interacting with sea turtles.

Formal ESA section 7 consultation has been conducted on the following fisheries which may adversely affect threatened and endangered species: American Lobster, Northeast Multispecies, Monkfish, Atlantic Pelagic Swordfish/Tuna/Shark, Summer Flounder/Scup/Black Sea Bass, Atlantic Mackerel/Squid/Atlantic Butterfish, Atlantic Bluefish, and Spiny Dogfish fisheries. These consultations are summarized below. More detailed information can be found in the respective Opinions.

The *Northeast Multispecies sink gillnet fishery* is one of the fisheries in the action area known to entangle sea turtles. This fishery has historically occurred along the northern portion of the action area from the periphery of the Gulf of Maine to Rhode Island in water to 60 fathoms. In recent years, more of the effort in the fishery has occurred in offshore waters and into the mid-Atlantic. Participation in this fishery declined from 399 to 341 permit holders in 1993 and has declined further since extensive groundfish conservation measures have been implemented. Based on 1999 data, NMFS estimated that there were 271 participants in the northeast multispecies sink gillnet fishery as defined under the MMPA. The fishery operates throughout the year with peaks in spring and from October through February. Data indicate that gear used in this fishery has seriously injured or killed loggerhead and leatherback sea turtles. Formal consultation on this fishery was last conducted in 1996.

The *monkfish fishery* uses several gear types that may entangle protected species, and takes of sea turtles have been recorded from monkfish trips. NMFS completed a formal consultation on the Monkfish FMP in June, 2001, which concluded that the fishery is likely to jeopardize the continued existence of the right whale and adversely affect but not jeopardize .humpback whales, fin whales, blue whales, sei whales, sperm whales or loggerhead, leatherback, Kemp's ridley, and green sea turtles.

The NMFS considered the take of loggerhead sea turtles in excess of the ITS during reinitiation of the section 7 consultation for the monkfish fishery. In April and early May 2000, the carcasses of 281 sea turtles, mostly loggerheads, washed ashore on North Carolina beaches. The monkfish fishery was operating offshore at the time that the turtles were present in the area. Fishing gear retrieved from four loggerhead carcasses was confirmed to be gillnet gear with 10-12 inch mesh; gear that is consistent with gillnets for monkfish. The ITS issued with the December 21, 1998, Opinion for the monkfish FMP only allowed for the observed lethal take of three loggerheads. Due to the FMP implemented on November 8, 1999, and associated regulations enacted on May 1, 2000, the monkfish fishing effort has been reduced. A limited access permit program has reduced the number of fishers participating in the fishery, resulting in a reduction in fishing effort. As of April 9, 2001, the number of trips and vessels participating in the monkfish gillnet fishery have been intensively monitored for North Carolina and Virginia. Comparing this information to the North Carolina call-in data from 2000 suggests that the fishing effort has been reduced to a third of previous levels. By limiting the number of participating fishers, the interactions with sea turtles is expected to also be reduced.

Components of the Highly Migratory Species (HMS) *Atlantic pelagic fishery for swordfish/tuna/shark* in the EEZ have occurred within the action area for this consultation. Use of pelagic longline, pelagic driftnet, bottom longline, hand line (including bait nets), and/or purse seine gear in this fishery has resulted in the take of sea turtles. The northeast swordfish driftnet portion of the fishery was prohibited during an emergency closure that began in December 1996, extended through May 31, 1997, and was subsequently extended for another six months. An extensive environmental assessment was prepared to evaluate this fishery from both a fisheries and a protected species perspective. The northeast swordfish driftnet segment was reopened on August 1, 1998, but a final rule to prohibit the use of driftnet gear in the swordfish fishery was published on January 27, 1999 (64 FR 4055). A final rule implementing a new comprehensive FMP for the whole pelagic fishery, which incorporates the driftnet closure, was published on May 28, 1999 (64 FR 29090).

The most recent consultation on the FMP for the Atlantic pelagic fishery for swordfish/tuna/shark was completed on June 8, 2001. NMFS concluded that operation of the pelagic longline fishery jeopardized the continued existence of threatened loggerhead and endangered leatherback sea turtles, and to avoid the likelihood of jeopardizing the continued existence of loggerhead and leatherback sea turtles, fishery management measures must reduce the number of loggerhead sea turtles and leatherback sea turtles that are incidentally captured, injured, or killed by gear associated with HMS fisheries in the United States by at least 55% from current levels. The Opinion prescribed one reasonable and prudent alternative to meet this goal and avoid the likelihood of jeopardizing these listed sea turtles. NMFS must commence rulemaking immediately upon issuance of this opinion to promulgate regulations that close the entire NED area to fishing with pelagic longline gear for U.S. vessels. These regulations became effective through an emergency rule on July 15, 2001 (66 *FR* 36711, July 13, 2001).

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Based on occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales, particularly humpback whales. The pot gear and staked trap sectors could also entangle whales and sea turtles. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl (which would include fisheries for other species like scup and black sea bass) by requiring TEDs in nets in the area of greatest bycatch off the North Carolina coast. NMFS is considering a more geographically inclusive regulation to require TEDs in trawl fisheries that overlap with sea turtle distribution to reduce the impact from this fishery. Developmental work is also ongoing for a TED that will work in the flynets used in the weakfish fisheries. Formal consultation on the summer flounder, scup and black sea bass fishery concluded that the operation of the fishery may adversely affect but is not likely to jeopardize the continued existence of listed species. Expected annual incidental take for this fishery includes 15 threatened loggerhead sea turtles and no more than three cumulatively of endangered Kemp's ridleys, hawksbill, leatherback or green sea turtles.

On April 28, 1999, NMFS completed a formal consultation on the *Atlantic Mackerel/Squid/Atlantic Butterfish fishery*. This fishery is known to take sea turtles. Several types of gillnet gear may be used in the mackerel/squid/butterfish fishery. Other gear types that may be used in this fishery include pelagic longline/hook-and-line/handline, pot/trap, dredge, poundnet, and bandit gear. Entanglements or entrapments of sea turtles have been recorded in one or more of these gear types. An ITS has been issued for the taking of sea turtles and shortnose sturgeon in this fishery. The ITS allows for the annual take of six loggerhead sea turtles of which no more than three can be lethal takes, two lethal or non-lethal takes of green sea turtles, two lethal or non-lethal takes of Kemp's ridley sea turtles, one lethal or non-lethal take of leatherback sea turtles.

Formal consultation on the *Atlantic Bluefish* fishery was completed on July 2, 1999. NMFS concluded that operation of the fishery under the FMP, as amended, is not likely to jeopardize the continued existence of listed species and not likely to adversely modify critical habitat. Gillnets are the primary gear used to commercially land bluefish. The bluefish fishery is most likely to interact with sea turtles (primarily Kemp's ridley and loggerheads) given the time and locations where the fishery occurs. A small number of takes of sea turtles and shortnose sturgeon were authorized in the ITS issued with the July 2, 1999, Opinion as follows: six takes (no more than three lethal) of loggerhead sea turtles and six lethal or non-lethal takes of Kemp's ridley sea turtles.

Formal consultation on the *Spiny dogfish* fishery was completed on August 13, 1999. NMFS concluded that the operation of the fishery under the FMP may adversely affect but is not likely to jeopardize the continued existence of listed species and not likely to adversely modify critical habitat. The dogfish fishery is most likely to interact with sea turtles (all species) given the time and locations where the fishery occurs. The FMP for dogfish calls for a 30% reduction in quota allocation levels for the first year of the plan and a 90% reduction beginning with year two. Although there have been delays in implementing the plan, quota allocations are expected to be substantially reduced over the 4 ½ year rebuilding schedule which should result in a substantial decrease in effort directed at spiny dogfish. For the last four years of the rebuilding period, dogfish landings are likely to be limited to incidental catch in other fisheries. The reduction in effort should be of benefit to protected species by reducing the number of gear interactions that occur.

Large-mesh gillnetting for dogfish off of North Carolina has been implicated as a possible source of mortality leading to the large number of sea turtle carcasses that washed ashore on the Outer Banks in April and May, 2000. However, there is very limited observer coverage for this fishery, making it difficult to determine the role that this fishery might have played in the mortality event. The ITS issued with the August 13, 1999, Opinion allows for the take of six loggerhead sea turtles (of which no more than three can be lethal takes), one lethal or non-lethal take of green sea turtles, one lethal or non-lethal take of Kemp's ridley sea turtles, and one lethal or non-lethal take of leatherback sea turtles.

The Southeast U.S. Shrimp Fishery is known to take large numbers of sea turtles. Shrimp trawlers in the southeastern U.S. are required to use TEDs, which reduce hard shelled sea turtle capture rates by 97%. Even so, NMFS estimated that 4,100 turtles may be captured annually by shrimp trawling, including 650 leatherbacks that cannot be released through TEDs, 1,700 turtles taken in try nets, and 1,750 turtles that fail to escape through the TED (NMFS 1998). Henwood and Stuntz (1987) reported that the mortality rate for trawl-caught turtles ranged between 21% and 38%, although NRC (1990) suggested Henwood and Stuntz's estimates were very conservative and likely an underestimate of the true mortality rate.

(4) ESA Permits
Regulations developed under the ESA allow for the taking of ESA-listed sea turtles for the purposes of scientific research. In addition, the ESA also allows for the taking of listed species by states through cooperative agreements developed per section 6 of the ESA. Prior to issuance of these authorizations for taking, the proposal must be reviewed for compliance with section 7 of the ESA. There are currently no active scientific research permits directed toward sea turtles in the NED area.

(b) State or private actions

(1) State fishery operations
State fisheries are known to interact with protected species. For example, in 1998, three entanglements of humpback whales in state-water fisheries were documented. Sea turtles have frequently been found, unharmed, within the pounds of several state pound-net fisheries. Data from the marine mammal and sea turtle stranding networks are also useful for identifying interactions of protected species with state fisheries. However, documenting the exact number of state fishery interactions with protected species is difficult. Interactions may not always be reported, and stranding data is often insufficient for identifying the exact cause or location of the interaction. For example, recovered carcasses may be too decomposed for a thorough analysis, entangled whales may swim away from the site of the entanglement, and sea turtles that drown as a result of an interaction leave no visible clue as to the type of gear encountered. For these reasons the extent of take of ESA-protected species in fisheries that operate strictly in state waters cannot be fully determined. The NMFS is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters.

The *American lobster pot fishery* is the largest fixed gear fishery in the northeastern U.S. coastal waters. This fishery is known to take endangered whales and sea turtles. An ITS has been issued for sea turtles takes in this fishery. The ITS allows for take of up to ten loggerhead or four leatherback sea turtles.

South Carolina, Georgia and Florida authorize pot fisheries that may affect threatened and endangered turtles: a trap fishery for blue crab (*Calinectes sapides*) and a trap fishery for stone crab (*Menippe mercenaria*). NMFS has historic data showing that listed sea turtles interact with lobster pots and can become entangled in the buoy line attached to the trap. The 1994 biological opinion on the Maine lobster fishery management plan summarized suspected interactions with the lobster fishery between 1983 and 1993 and noted 45 leatherbacks of which approximately 50% were dead. The state of Florida has anecdotal information concerning turtle entanglement in lobster and crab traps in the state. (Teehan, 2000).

The *state fishery for menhaden* in state waters of Louisiana and Texas is managed by the Gulf States Marine Fisheries Council and are not federally regulated for sea turtle take. The fishery has been classified as a class-II fishery for marine mammal interactions and are required by the Marine Mammal Protection Act of 1972 to report all interactions with marine mammals. However, no such reporting exists for sea turtle takes in the fishery. Condrey and Rester (1996) reported a hawksbill take in the fishery and other turtles have been reported in the fishery between 1992 and 1999 (DeSilva, 1999).

(2) *Electrical Power Generation*.
Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. At the St. Lucie nuclear power plant at Hutchinson Island, Florida, large numbers of green and loggerhead turtles have been captured in the seawater intake canal in the past several years. Annual capture levels from 1994-1997 have ranged from almost 200 to almost 700 green turtles and from about 150 to over 350 loggerheads. Almost all of the turtles are caught and released alive; NMFS estimates the survival rate at 98.5% or greater (NMFS 1997d). Other power plants in Florida, Texas, and North Carolina have also reported low levels of sea turtle entrainment, but formal consultation on these plants' operations has not been completed.

Other Potential Sources of Impacts in the Baseline
A number of anthropogenic activities that may indirectly affect listed species in the Atlantic basin include habitat loss, debris, contaminants, disease and natural disturbances. The impacts from these activities are difficult to measure.

Habitat Loss. Coastal development can deter or interfere with nesting, affect nest success, and degrade foraging habitats for sea turtles. Nesting beaches of the southeastern United States, with special emphasis being placed on Florida, are essential to the recovery and survival of sea turtles. Many nesting beaches have already been significantly degraded or destroyed. Nesting habitat is threatened by rigid shoreline protection or "coastal armoring" such as sea walls, rock revetments, and sandbag installations. Many miles of once productive nesting beach have been permanently lost to this type of shoreline protection. Additionally, nesting habitat can be negatively impacted by beach nourishment projects that result in altered beach and sand characteristics that affect nesting activity and nest success. Artificial beachfront lighting, increased human activity, and beach driving also seriously threaten species recovery. In light of these issues, conservation and long-term protection of sea turtle nesting habitats is an urgent and high priority need.

Debris. Ingestion of marine debris can be a serious threat to sea turtles. When feeding, sea turtles can mistake debris for natural food items. An examination of the feeding habits of loggerhead hatchlings inhabiting offshore convergence zones revealed a high incidence of tar and plastic ingestion. Some types of marine debris may be directly or indirectly toxic, such as oil. Other types of marine debris, such as discarded or derelict fishing gear, may entangle and drown sea turtles. Marine debris likely affects sea turtles throughout the Atlantic basin.

Contaminants. Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities and industries into the Atlantic and Gulf of Mexico.

Although these contaminant concentrations do not likely affect the more pelagic waters of the action area, the species of turtles analyzed in this biological opinion travel between near shore and offshore habitats and may be exposed to and accumulate these contaminants during their life cycles.

An extensive review of environmental contaminants in turtles has been conducted by Meyers-Schöne and Walton (1994); however, most available information relates to freshwater species. High concentrations of chlorobiphenyls and organochlorine pesticides in the eggs of the freshwater snapping turtle, *Chelydra serpentina*, have been correlated with population effects such as decreased hatching success, increased hatchling deformities and disorientation (Bishop *et al* 1991, 1994). Very little is known about baseline levels and physiological effects of environmental contaminants on marine turtle populations (Witkowski and Frazier 1982; Bishop *et al* 1991). There are a few isolated studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Davenport and Wrench 1990; Aguirre *et al* 1994). Mckenzie *et al* (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in marine turtles tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles. It is thought that dietary preferences were likely to be the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. Sakai *et al* (1995) found the presence of metal residues occurring in loggerhead turtle organs and eggs. More recently, Storelli *et al* (1998) analyzed tissues from twelve loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals and porpoises by Law *et al* (1991). Research is needed on the short- and long-term health and fecundity effects of chlorobiphenyl, organochlorine, and heavy metal accumulation in sea turtles. No studies are currently looking at contaminant loads of turtles in south Florida, however, due to the high rate of development around South Florida, NMFS believes contaminants are likely affecting listed turtles there.

Disease. A disease known as fibropapillomatosis (FP), originally identified in green turtles, has emerged as a serious threat to their recovery. The disease is most notably present in green turtles of Hawaii, Florida, and the Caribbean. FP is expressed as tumors which occur primarily on the skin and eyes, and the disease can be fatal. In Hawaii, green turtles afflicted with FP have a high incidence of tumors in the oral cavity, whereas oral tumors have not been found in Florida or other areas. The cause of the disease remains unknown. In Florida, up to 50% of the immature green turtles captured in the Indian River Lagoon are infected, and there are similar reports from other sites in Florida, including Florida Bay, as well as from Puerto Rico and the U.S. Virgin Islands. In Florida, the disease has been found to affect up to 13% of loggerheads inhabiting Florida Bay. FP appears to be the chief threat to full recovery of the Hawaii green turtle population, and the disease could hinder the recovery of green turtle populations elsewhere as well. Research to determine the cause of this disease is a high priority and is underway.

Natural Disturbances. Each summer, hurricanes form in the Atlantic Ocean between Africa and North America. Storm tracks have traversed the Caribbean Sea and have entered the Gulf of Mexico. Since 1990, eight named hurricanes and tropical storms have come within one degrees latitude of the U.S. Virgin Islands. Six of these have come within one degree latitude and two have hit the island directly. In September, 1995, hurricane Luis passed just north of the USVI, and one week later, hurricane Marilyn passed directly over St. Thomas. Hurricanes have the potential to cause significant damage to turtle nesting efforts during nesting season when eggs are incubating. Hurricane storm surge can cause beach erosion, washing away protective layers of sand incubating the eggs, nests can be flooded and the embryos drowned or the nests can even be swept out to sea. In September 1998, hurricane Georges passed directly over St. Croix, U.S.V.I. with reported sustained winds at 93 mph. Damage to nesting beaches and coral reefs and sea grass beds that serve as foraging habitat for green and hawksbill turtles was also reported. The U.S. Geologic Service reported storm surges of up to ten feet above normal and severe beach erosion. Recovery of turtle nesting beaches from these disturbances varies widely depending on local conditions.

(c) Conservation and recovery actions shaping the environmental baseline

A number of activities are in progress that may ameliorate some of the threat that activities summarized in the *Environmental Baseline* pose to threatened and endangered species. These include education/outreach activities and gear modifications.

Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. Nearly all of the measures described below include some education/outreach component. These include an extensive array of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate live stranded turtles. Data collected by the STSSN are used to monitor stranding levels and compare them with fishing activity in order to determine whether additional restrictions on fishing activities are needed. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. STSSN participants also opportunistically tag live turtles (either via the stranding network through incidental takes or in-water studies). Tagging studies help provide basic life history information, including sea turtle movements, longevity, and reproductive patterns. In some cases, an STSSN-wide protocol is developed to address a particular problem. For example, currently all of the states that participate in the STSSN are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of the small subpopulation of northern nesting loggerheads. Unlike cetaceans, there is no organized, formal program for at-sea disentanglement of sea turtles. However, recommendations for such programs are being considered by NMFS pursuant to conservation recommendations issued with several recent section 7 consultations. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen.

Interactions with fishing gear pose a risk to sea turtles. NMFS has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial fisheries. Many of these are focused on fisheries that primarily operate in waters south of the action area for this consultation, such as the shrimp fishery. However, TEDs, which were first developed to address the take of turtles in the shrimp trawl fishery, have been used in summer flounder trawls in the mid-Atlantic area (south of Cape Henry, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. The regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), flotation, and more widespread use. As fisheries expand to include underutilized and unregulated species, trawl effort directed at these species may be an undocumented source of mortality for which TEDs should be considered. NMFS is also working to develop a TED that can be effectively used in a type of trawl known as a flynet, which is sometimes used in the mid-Atlantic and northeast fisheries for summer flounder, scup, and black sea bass. Regulations will be formulated to require use of TEDs in this fishery if observer data conclusively demonstrate a need for such TEDs.

Summary and synthesis of the status of species and environmental baseline

In summary, the potential for vessels, military activities, fisheries, *etc*. to adversely affect sea turtles remains throughout U.S. Atlantic coastal and offshore waters. However, recovery actions have been undertaken as described and continue to evolve. These actions should not only improve conditions for listed sea turtles, they are expected to reduce sources of human-induced mortality as well. However, a number of factors in the existing baseline for loggerhead sea turtles and leatherback sea turtles leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with both state and federal fisheries:

(a) The leatherback sea turtle is declining worldwide. The environmental baseline includes several ongoing sources of mortality to this population which exceed the 1% sustainable level projected by Spotila *et al.* (1996).

(b) The northern subpopulation of loggerhead sea turtles is declining or stable and currently numbers only about 3,700 nesting females. The percent of northern loggerheads represented in sea turtle strandings in northern U.S. Atlantic states is over-representative of their total numbers in the overall loggerhead population. Pelagic immature phase animals are critical to growth of the population as a whole. Current take levels from other sources, particularly fisheries, are high. The loss of this subpopulation would affect the species throughout its range as a result of decreased genetic diversity.

Effects of the Action

This section of a Biological Opinion assesses the direct and indirect effect of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

Longline fisheries generally affect sea turtles by entangling or hooking the turtles in fishing gear. Turtles that become entangled in longline gear may drown when they are forcibly submerged or they may be injured by the entangling lines. Turtles that are hooked by longline gear can be injured or killed, depending on whether they are hooked internally or externally and whether the hook sets deep in their tissue. In addition to these immediate effects, longline gear can have long-term effects on a turtle’s ability to swim, forage, migrate, and breed, although these long-term effects are difficult to monitor or measure.

Estimated Number of Turtles Taken in the Permitted Activity

The applicant estimated take numbers of loggerheads and leatherbacks based on the levels of fishing effort that would be required to complete the experiment at the high (1999) and average (1991-1999) CPUE observed in the U.S. Atlantic fishery in the NED area (Yeung *et al.*, 2000 amended). The applicant also used conservative assumptions in applying bycatch reduction factors from the experimental treatments to develop their estimate that the number of turtles that could be taken under this permit is 415 loggerheads and 301 leatherbacks. Green, hawksbill, and Kemp’s ridley turtles are rarely if ever taken as bycatch in the NED pelagic longline fishery, and the applicants do not expect to take more than 2 of any of these species. Based on the proportion of animals observed boated dead over the 1992-1999 period by the U.S. Atlantic pelagic longline fishery (0.01 for loggerheads and 0.004 for leatherbacks; Yeung, 2001), the applicants expect that the number boated dead in this experiment will be 4 loggerhead and 1 leatherback; there is the potential that one green, Kemp’s ridley, or hawksbill, in aggregate, also could be boated dead. These are the take levels applied for by the SEFSC and would represent the maximum take, as, under 100% observer coverage, the experiment will be terminated when the allowable take limit for any single species is reached. Because of the experiment’s structure and the permit requirement to conduct a preliminary evaluation that may allow the testing of clearly effective or clearly ineffective treatments to be terminated early, it is possible that the actual take will be less than applied for. In this Opinion, however, NMFS is analyzing the effects of takes at the full level.

The applicant did not estimate the degree of post-release mortality affecting turtles taken in the proposed research activity. This Opinion adopts the mortality estimates from the February 16, 2001, policy memorandum that specifically analyzes this issue. NMFS assumes that (1) sea turtles that are entangled in gear, but not hooked, and are released with no trailing line or visible injuries would not be expected to suffer any mortalities; (2) sea turtles that are externally hooked, including mouth hooks that do not penetrate mouth tissues, would be expected to have a 27% mortality rate; (3) sea turtles that are hooked in mouth tissues or that ingest hooks would have a 42% mortality rate. Observer data of pelagic longline sea turtle takes have not previously been recorded using these particular categories. NMFS, in the June 8, 2001, Biological Opinion on HMS Fisheries, examined the interaction of these post-release mortality rates with the observed location of hooks in turtles captured in 1999 and 2000 and produced overall estimates of post-hooking mortality of 26-35% for loggerheads and 18-21% for leatherbacks. Using these factors, between 107 and 144 loggerheads and between 54 and 63 leatherbacks caught in this experiment may be expected to eventually succumb to hooking-related injuries.

The presence of observers aboard every vessel in the experiment will provide trained handlers for removing lines, hooks and nets, resuscitation (if needed), and collect information on the species being caught, how they were hooked/entangled, where they were captured, degree of injury (if any), and other important demographic information. NMFS believes that the presence of trained observers onboard commercial fishing vessels will ensure that injured turtles are properly resuscitated when needed. The Magnuson-Stevens Fisheries Act requires fishermen to dehook and untangle any turtles incidentally taken in these fisheries, however, NMFS has no independent verification that this is occurring, and believes that having trained observers onboard is a direct benefit to the species. The February 16, 2001, policy memorandum specifically considered “reduced compliance rates with mitigation measures...when observers were not present” as part of the basis for precautionary choices in developing the post-hooking mortality estimates. Since the memorandum gave no guidance on how to account for the presence of observers, this Opinion will not attempt to quantify the benefit of their presence, but does consider that the post-hooking mortality estimate, as applied to this experiment, is very conservative and an absolute maximum.

Handling during the collection of standard morphometric measurements, collection of tissue samples, and flipper and PIT tagging

The applicant has requested authorization to handle, examine, resuscitate (if necessary), and release up to a total of 722 (2 green, 301 leatherback, 415 loggerhead, 2 hawksbill and 2 Kemp's ridley) turtles, following their capture by commercial pelagic longline fishing gear. Since all of these species will have already been captured by hooking or entanglement by fishing gear, any additional harassment of turtles by observers may exacerbate already raised levels of stressor hormones or cause additional discomfort. In addition to overseeing the experimental research program aboard each boat, the observers are intended to provide both trained handlers for removing lines and hooks, resuscitation (if needed), and collecting information on the species being caught, how they were hooked/entangled, where they were captured, degree of injury (if any), and other important morphometric and demographic information. NMFS believes that the presence of trained observers onboard longline vessels will ensure that injured turtles are properly resuscitated when needed. Based on past observations of similar research on turtles that have been stressed due to multiple submergences, physiological stress effects (*i.e.*, non-physical injury) are expected to dissipate within a day (Stabenau and Vietti, 1999).

The applicants have also requested authorization to insert PIT tags into up to a total of 722 (2 green, 301 leatherback, 415 loggerhead, 2 hawksbill and 2 Kemp's ridley) turtles. PIT tags are small inert microprocessors sealed in glass that can transmit a unique identification number to a hand-held reader when the reader briefly activates that tag with a low frequency radio signal at close range. PIT tags range in size from 11.5 x 2.1 mm to 20.0 x 3.2 mm. Over time, PIT tags can migrate within body tissue making it necessary to scan the entire surface of the implantation area. PIT tags have the advantage of being encased in glass, which makes them inert, and are positioned inside the turtle where loss or damage over time due to abrasion, breakage, corrosion or age over time is virtually non-existent (Balazs, 1999).

The applicants have requested authorization to attach flipper tags to all turtles handled under this permit (up to a total of 722 turtles). Flipper tags are commonly made of either plastic or titanium. Flipper tagging has been used for more than 20 years (Balazs, 1999) to track sea turtle movement and growth. All tag types have negatives associated with them, especially concerning tag retention. Plastic tags can become brittle, break and fall off underwater, and titanium tags can bend during implantation and thus not close properly, leading to tag loss. The small wound-site resulting from a tag applied to the flipper should heal completely in a short period of time, similar to what happens when a person's ear is pierced for an earring. The risk of infection is low, because the equipment and tag are sterilized prior to tagging of each turtle.

The application of PIT and flipper tags will produce some level of pain to the turtle receiving the tag (Balazs, 1999). The discomfort displayed is usually short and highly variable between individuals. Balazs (1999) states that most turtles barely seem to notice, while others exhibit a marked response. No post-tagging infection has been noted by previous researchers and observers using these techniques. NMFS does not anticipate any mortality or long term adverse effect to the turtle with the attachment of flipper tags or insertion of PIT tags.

The applicant has requested authorization to collect tissue samples from up to 722 turtles. If the turtle is brought aboard the vessel, the turtle will have a tissue sample collected from the trailing edge of a rear flipper. If the turtle is too large to bring aboard the vessel, the sample will be collected from the location most easily accessed by the researcher/observer (usually the flipper). Samples will be collected from anywhere on the limbs or neck, avoiding the head. Samples may be collected from the carapace of the leatherback turtle if necessary. For all tissue sample collections, a sterile 6mm punch sampler is used. If the animal is able to be landed onboard the vessel, the sample area is swabbed with alcohol to clean it before the sample is collected. Researchers who examined turtles caught two to three weeks after sample collection noted the sample collection site was almost completely healed (Witzel, pers. comm.). NMFS does not expect that the collection of a tissue sample will cause any additional stress or discomfort to the turtle beyond what was experienced during capture, collection of measurements and tagging.

Attachment of Satellite Transmitters
The applicant has requested to attach conventional satellite transmitters to up to 20 loggerhead turtles and up to 75 pop-up satellite (PSAT) tags to up to 75 loggerhead turtles. Satellite transmitters will be attached to hard-shelled turtles over 45 cm in length with a short lanyard that is secured with a corrodible-crimped lanyard through a small hole drilled in the trailing edge of the carapace. Attachment of the PSAT tag base (Wildlife Computer tags weigh less than 60 g) to the carapace will be via either fiberglass mesh and laminating resin or by epoxy, the latter a technique being developed and tested by the SWFSC(Anon. 2001c). The procedures developed by the SWFSC use Marine Fix ® Fast (MFF) epoxy to attach a baseplate on a dry carapace on clean flat scutes toward the back of the turtle. The epoxy is mixed according to manufacturers instructions and applied to the base plate of the satellite attachment system. The base plate is then pressed down firmly against the carapace for a few minutes to squeeze out any air pockets. Excess epoxy on the sides of the base plate are smoothed out with a wet gloved fingertip. The

epoxy hardens completely in 30 minutes. The fiberglass mesh and laminating resin, depending on ambient temperature, will cure in 30 min to 1 hr. The PSAT tag is then attached to the base plate using a short lanyard attachment.

The proposed permit also requires that the applicants provide adequate ventilation around the turtle's head during the attachment of all transmitters. To prevent skin or eye injury due to the chemicals in the resin, the transmitter attachment process must not take place in the water. The permit will include the special condition that the total weight of transmitter attachments for any one turtle must not exceed 5% of the body mass of the animal. Each attachment must be made so that there is no risk of entanglement. The transmitter attachment must either contain a weak link or have no gap between the transmitter and the turtle that could result in entanglement. The techniques proposed by the applicant for using lanyards attached to holes drilled in the trailing edge of the carapace should eliminate the possibility of injury or infection from the tag attachment.

Based on past experience with this applicant using these techniques, the procedures, the effects of similar activities by NMFS researchers, and the documented effects of transmitter attachment, NMFS does not expect that the attachment of satellite or PSAT transmitters will cause significant additional stress beyond what was experienced during capture, collection of measurements and tagging.

Effects of the Taking and the Proposed Research on the Species
Earlier in this section, it was estimated that the proposed research would capture with commercial longline gear up to a maximum of 415 loggerhead, 301 leatherback, 2 green, 2 Kemp's ridley, and 2 hawksbill sea turtles. Of those, up to 4 loggerheads, 1 leatherback, and 1 green, Kemp's ridley, or hawksbill may be boated dead. For the turtles that are released, injuries sustained from the capture are estimated, using precautionary assumptions, to lead to the subsequent death of between 107 and 144 loggerheads and between 54 and 63 leatherbacks. The scientific sampling proposed to be conducted on individual turtles upon capture is not expected to add significantly to the stress and injury, and therefore the overall effects, incurred by the animals.

The level of mortality on greens, Kemp's ridleys, and hawksbills is very small and not expected to be a significant effect on the populations of any of these three species, should that take and estimated mortality occur. The level of take and mortality of loggerhead and leatherback turtles is not trivial, though, and begins to approach the levels seen for annual takes in major fisheries. For comparison, the level of take in the U.S. Atlantic pelagic longline fleet per year from 1992-1999 has averaged about 2-1/2 times higher than the total level of take for this 17-month research project. In contrast to the major fisheries, though, the proposed action has a finite period of performance, strict limits on the total level of take, and 100% observer coverage as a means to monitor and enforce those limits, rather than being a continuous activity with a limited ability to track and control sea turtle take and mortality as it occurs. The 100% monitoring will ensure that hooks and line will be removed, when possible, and thus the impact from the injury would be reduced. Population modeling indicates that it is the chronic, sustained mortality in the leatherback adult and juvenile stages that impacts the population (Spotila *et. al*, 1996). Long-lived species with high reproductive output, such as sea turtles, have a much greater ability to withstand periodic, limited reductions in numbers than they do to sustain a heavier, continuous elevation of total mortality. Were the level of mortality proposed in this permit continuing on an extended (e.g. sea turtle generation time) basis, the risk posed to the species would be very much greater.

Currently, some species are already heavily impacted. As discussed above in the "Summary and synthesis of the status of species and environmental baseline" section, the northern subpopulation of loggerheads is declining or stable and failing to progress toward recovery goals, and the leatherback sea turtle is declining worldwide. These subpopulations contribute genetic diversity which is critical to the species as a whole. Bycatch and mortality in fisheries are high for these species and are significant historical and ongoing contributors to their current imperilled status. Commercial pelagic longline fishing has been developing and expanding worldwide over the past several decades and, as the extent of the take of sea turtles in those fisheries has become better understood in recent years, has become a source of major concern for sea turtle conservation. In the case of the U.S. Atlantic and Hawaii-based pelagic longline fisheries, NMFS has concluded that the continued long-term operation of the fisheries, without reasonable and prudent alternatives to reduce total take, are likely to jeopardize the continued existence of species of sea turtles in the Atlantic and Pacific Oceans (Biological Opinions dated June 8, 2001 and March 31, 2001). Even with take reductions in those domestic fisheries that limit their impact to a level that would no longer represent an appreciable reduction in the species' likelihood of survival and recovery, some species of turtles still may not survive and recover, due to continuing threats in the environmental baseline, particularly fisheries bycatch.

The U.S. fleet is a small part of the international fleet that competes on the high seas for catches of tunas and swordfish. Within the area where the U.S. fleet operates in the Atlantic, the U.S. portion of fishing effort, in numbers of hooks fished is less than 10% (5-8% of hooks sampled) of the entire international fleet's effort, and likely less than that due to differences in reporting effort between ICCAT countries (NMFS SEFSC 2001, Part III, Chap. 1). Relative to foreign fishing effort and turtle impact, thus, the U.S. domestic fleet represents only a fraction. Without methods to reduce longline fishery bycatch of turtles in the U.S. and foreign fleets, the survival and recovery of loggerhead and leatherback turtles may not be possible. In fact, the June 8, 2001 Opinion determined, based on modeling from NMFS SEFSC (2001), that a 55% reduction in pelagic longline sea turtle bycatch mortality was necessary to ensure a stable or growing trajectory for the northern subpopulation of loggerheads. Obviously, the U.S. fleet, with less than 10% of the North Atlantic fishing effort, could not account for this level of reduction even if it were entirely eliminated, and fishing effort limitations of 55% by the foreign fleets operating in the Atlantic are not reasonable to expect. To achieve comprehensive sea turtle take reductions in pelagic longline fisheries that will have a long-term significant effect on loggerhead and leatherback survival and recovery, measures must be found that can be implemented by the large, international fleet that fishes the entire Atlantic. Fishing tactics and modified gear configurations – technical solutions – that allow longline vessels from all fleets to continue to catch target species effectively are likely to be exportable solutions that meet that requirement.

The purpose of the proposed research is to develop just these technical solutions. Very little research has been accomplished to date to address this issue. NMFS agrees with the applicant that the proposed research addresses one of the most pressing conservation research questions facing sea turtles worldwide. Although the proposed research will itself take sea turtles, it is occurring against a background of much greater levels of turtle take in commercial longline fishing fleets. The sooner that turtle bycatch reduction research gets underway and produces results, the greater the benefit to sea turtle survival and recovery that can be realized, before population declines continue even further.

The essential analysis in this biological opinion is whether the proposed research will affect sea turtles in a way that, in combination with the environmental baseline and probable cumulative effects, is likely to appreciably reduce the likelihood of any species' survival and recovery in the wild. The proposed research is expected to capture and injure 722 turtles of which between 107 and 144 loggerheads and between 54 and 63 leatherbacks may be lethal. It is expected that injured boated turtles will be treated and thus the impacts from these injuries will be reduced. The level of mortality for loggerheads and leatherbacks from the proposed research is not insignificant. However, it is anticipated that these injuries and mortalities would be compensated by recruitment into the adult population given the take will occur only during a 17-month period and will not be sustained. Because of the limited duration of the permit and its 100% monitoring the taking is not expected to appreciably decrease these population's likelihood of surviving and recovering in the wild.

The proposed research is expected to capture and injure 2 green, 2 Kemp's ridley, or 2 hawksbill turtles of which 1 of each species may be boated dead. This take level is not sufficient to appreciably reduce their likelihood of surviving and recovering in the wild.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably expected to occur in the action area. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative effects from unrelated, non-federal actions occurring in the northwest Atlantic may affect sea turtles, marine mammals, and their habitats. Stranding data indicate marine mammals and sea turtles in Atlantic waters die of various natural causes, including cold stunning (in the case of sea turtles), as well as human activities, such as incidental capture in state fisheries, ingestion of or entanglement in debris, ship strikes, and degradation of nesting habitat. The cause of death of most marine mammals and turtles recovered by the stranding network is unknown.

Numerous fisheries in State waters along the Atlantic coast have been known to adversely affect threatened and endangered sea turtles and marine mammals. The past and present impacts of these fisheries have been discussed in the Environmental Baseline section of this biological opinion. Most of these fisheries will be prosecuted concurrent with the fisheries prosecuted under the Atlantic Highly Migratory Species Fishery Management Plan and can be expected to continue into the future. The future effects of these fisheries will be discussed in this section of this Opinion.

Trawls
Numerous trawl fisheries in State waters along the Atlantic coast have adversely affected threatened and endangered sea turtles in the past and can be expected to adversely affect sea turtles in the future. A detailed summary of the impacts of the U.S. shrimp trawl fishery and the Mid-Atlantic winter trawl fishery can be found in TEWG (1998, 2000) and NMFS SEFSC (2001). Other bottom trawl fisheries that may impact sea turtles are the horseshoe crab fishery in Delaware (Spotila *et al.* 1998) and the whelk trawl fishery in South Carolina (S. Murphy, pers. comm. to J. Braun-Mcneill, November 27, 2000) and Georgia (M. Dodd, pers. comm. to J. Braun-McNeill, December 21, 2000). In South Carolina, the whelk trawling season opens in late winter and early spring when offshore bottom waters are > 55ºF. One criterion for closure of this fishery is water temperature: whelk trawling closes for the season and does not reopen throughout the state until 6 days after water temperatures first reach 64ºF in the Fort Johnson boat slip. Based on the South Carolina Department of Natural Resources Office of Fisheries Management data, approximately 6 days will usually lapse before water temperatures reach 68ºF, the temperature at which sea turtles move into state waters (D. Cupka, pers. comm.). From 1996-1997, observers onboard whelk trawlers in Georgia reported a total of 3 Kemp's ridley, 2 green and 2 loggerhead sea turtles captured in 28 tows for a CPUE of 0.3097 turtles/100ft net hour. As of December 2000, TEDS are required in Georgia state waters when trawling for whelk.

The North Carolina Observer program documented 33 flynet trips from November through April of 1991-1994 and recorded no turtles caught in 218 hours of trawl effort. However, a NMFS- observed vessel fished for summer flounder for 27 tows with an otter trawl equipped with a TED and then fished for weakfish and Atlantic croaker with a flynet that was not equipped with a TED. They caught 1 loggerhead in 27 TED-equipped tows and 7 loggerheads in 9 flynet tows without TEDs. In addition, the same vessel using the flynet on a previous trip took 12 loggerheads in 11 out of 13 observed tows targeting Atlantic croaker. A slight potential exists for interaction between this fishery and humpback whales, particularly in the mid-Atlantic, but no documentation of such interactions is available for this consultation.

In the future, we would expect these fisheries to continue at current levels of effort, and would expect the fisheries to capture, injure, or kill similar numbers of loggerhead turtles.

Hook and Line
In addition to trawl fisheries managed by States along the Atlantic coast, numerous hook and line fisheries have also adversely affected threatened and endangered sea turtles in the past and can be expected to adversely affect sea turtles in the future. Loggerheads are known to bite a baited hook, frequently ingesting the hook. Leatherbacks and greens also bite baited hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines. A detailed summary of the impact of hook and line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998, 2000) and NMFS SEFSC (2001).

In the future, we would expect recreational hook and line fisheries to continue at current levels of effort, and would expect the fisheries to capture, injured, or kill similar numbers of loggerhead, leatherback, and green turtles.

Pound Nets
Pound nets are a passive, stationary gear that are known to incidentally capture loggerhead sea turtles in Massachusetts (R. Prescott pers. comm.), Rhode Island, New Jersey, Maryland (W. Teas pers. comm.), New York (Morreale and Standora 1998), Virginia (Bellmund *et al*. 1987) and North Carolina (Epperly *et al.* 1995b). Although pound nets are not a significant source of mortality for loggerheads in New York (Morreale and Standora 1998) and North Carolina (Epperly *et al.* 2000), they have been implicated in the stranding deaths of loggerheads in the Chesapeake Bay from mid-May through early June (Bellmund *et al.* 1987). The turtles were reported entangled in the large mesh (>8 inches) pound net leads. (66 FR 33489).

In the future, we would expect State-managed pound net fisheries to continue at current levels of effort, and would expect the fisheries to capture, injure, or kill similar numbers of loggerhead turtles.

Gillnets
A detailed summary of the gillnet fisheries currently operating along the mid- and southeast U.S. Atlantic coastline that are known to incidentally capture loggerheads can be found in the TEWG reports (1998, 2000) and NMFS SEFSC (2001). Although all or most nearshore gillnetting in state waters of South Carolina, Georgia, Florida, Louisiana, and Texas is prohibited by state regulations, gillnetting in other states' waters and in federal waters does occur. Of particular concern are the nearshore and inshore gillnet fisheries of the mid-Atlantic that operate in state and federal waters off Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, and North Carolina. Incidental captures in these gillnet fisheries (both lethal and non-lethal) of whales and loggerhead, leatherback, green and Kemp's ridley sea turtles have been reported (W. Teas, pers. comm.; J. Braun-McNeill pers. comm.). In addition, illegal gillnet incidental captures have been reported in South Carolina, Florida, Louisiana and Texas.

In the future, we would expect gillnet fisheries in mid-Atlantic coastal States to continue at current levels of effort, and would expect the fisheries to capture, injured, or kill similar numbers of loggerhead, leatherback, green, and Kemp's ridley turtles. With the information available during the writing of this opinion, it is impossible to quantify the effects of these fisheries on sea turtles.

Other U.S. Fisheries

Incidental captures of loggerheads in fish traps set in Massachusetts, Rhode Island, New York, and Florida have been reported (W. Teas, pers. comm.). Although no incidental captures have been documented from fish traps set in North Carolina and Delaware (Anon 1995), they are another potential anthropogenic impact to loggerheads and other sea turtles. Lobster pot fisheries are prosecuted in Massachusetts (Prescott 1988), Rhode Island (Anon 1995), Connecticut (Anon 1995) and New York (S. Sadove, pers. comm.). Although they are more likely to entangle leatherback sea turtles, lobster pots set in New York are also known to entangle loggerhead sea turtles (*Ibid*.). We have no data on the number of turtles incidentally captured in these fisheries in other states. Long haul seines and channel nets in North Carolina are known to incidentally capture loggerhead and other sea turtles in the sounds and other inshore waters(J. Braun-McNeill, pers. comm.). We have no reports of turtle mortalities associated with this fishery (NMFS SEFSC 2001).

Dredging

In most areas of the U.S., annual dredging to accommodate commercial shipping occurs in the nearshore approaches to most of the major ports. Dredging may pose a threat to whales due to increased vessel traffic. This entails dredge vessel movement back and forth between dredging and dumping sites. However, these vessels in general are relatively slow moving and, under ESA section 7 consultations conducted on various dredging activities, various measures to mitigate this concern have been implemented, including posting of dedicated whale observers in high whale-use areas and seasons. Additionally, dredging may result in increased vessel traffic as deepening and/or widening of ports or channels attracts more and larger vessels to use these areas. Dredging is responsible for injury and mortality of sea turtles and is the subject of a number of mitigation measures contained in various Opinions conducted on these activities.

Pollutants, Oil, and Marine Debris

These factors are described in the environmental baseline and are very difficult to assess and quantify, but all would be expected to continue into the foreseeable future. They would be expected to continue to contribute to the habitat and physiological stresses on these populations (see NMFS SEFSC, 2001 and environmental baseline for more detail). This category of potential effects includes atmospheric loading of pollutants such as PCBs, storm water runoff from coastal towns, groundwater discharges, and river input and runoff, nutrient loading from land-based sources such as coastal community discharges, bioaccumulation of the neurotoxins, oil spills from tankers, illegal discharge of oil and tar from vessels discharging bilge water and marine debris that will persist in the action area despite MARPOL prohibitions.

Integration and Synthesis of Effects

Research activities which will be authorized under Permit # 1324 are expected to result in the take of a total of 722 turtles (2 green, 301 leatherback, 415 loggerhead, 2 hawksbill and 2 Kemp's ridley; of these up to 4 loggerheads, 1 leatherback, and 1 green, hawksbill, or Kemp's ridley may be boated dead). Activities that will be conducted under the permit include capture using experimentally-modified commercial pelagic longline fishing gear, handling, examination, flipper and PIT tagging, tissue sampling, resuscitation (if necessary), and release of these listed turtles. Conventional satellite tags and PSAT tags will be applied to up to 20 and 75 turtles, respectively. Handling of the turtles has been limited to minimize harm. Due to the expected effectiveness of research protocols proposed by the applicant to minimize harm, the applicants' experience with these protocols and listed turtles, and special conditions placed on the permit, it is anticipated that all of the live boated turtles will experience only short-term, non-lethal increases in stress during the handling, examination, tissue sampling, and tagging activities. NMFS does not believe that the additional activities being conducted by the observers on the turtles after they are brought aboard the vessel will cause any additional detectable adverse effects to the listed turtles. In most cases, NMFS believes the turtles will be in better condition than when they were brought aboard because they will have entangling gear and/or hooks removed, and will have additional recovery time before release.For the turtles that are released, injuries sustained from the capture are estimated, using precautionary assumptions, to lead to the subsequent death of between 107 and 144 loggerheads and between 54 and 63 leatherbacks.

Past experience with the researchers requesting the proposed permit suggests that they conduct research activities in a way that effectively minimizes mortality and the potential for injury. NMFS does not expect the proposed research activities to appreciably reduce the green, leatherback, loggerhead, hawksbill or Kemp's ridley sea turtles' likelihood of survival and recovery in the wild by adversely affecting their birth rates, death rates, or recruitment rates.

The results of the proposed research will likely lead to the development of longline bycatch reduction measures for sea turtles that will benefit loggerhead and leatherback sea turtles and their likelihoods of survival and recovery in the wild. The proposed research will also continue to contribute to our understanding of the migrations, habitat, foraging ecology and behavior, growth rates, genetic composition, and population dynamics of these species, with concentration on the pelagic North Atlantic Ocean. This information has been identified as a number one priority in the final recovery plans for the Atlantic populations of all five species.

Conclusion

After reviewing the current status of endangered and threatened green, threatened loggerhead, endangered leatherback, Kemp's ridley and hawksbill sea turtles, the environmental baseline, the effects of the proposed research program, and probable cumulative effects, it is NMFS' biological opinion that issuance of the permit for this scientific research, as proposed, is not likely to jeopardize the continued existence of the threatened loggerhead, endangered and threatened green, endangered leatherback, Kemp's ridley and hawksbill sea turtles; or result in any adverse modification of designated critical habitat.

Incidental Take Statement:

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the reasonable and prudent measures and terms and conditions of this Incidental Take Statement.

The permit is for the directed take, for research purposes, of listed sea turtles; no incidental take of other listed species is anticipated or authorized.

This opinion does not authorize any take of other listed species or immunize any actions from the prohibitions of section 9(a) of the ESA. Take is authorized by section 10(a) as specified in the permit.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

No additional Conservation Recommendations have been placed on this permit.

Reinitiation of Consultation

This concludes formal consultation on the ESA section 10 permit issued to Dr. Nancy B. Thompson, Acting Director of the Southeast Fisheries Science Center. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of take, specified in the permit, is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; (4) a new species is listed or critical habitat designated that may be affected by the identified action.

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